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Epistemic and Technological Determinism in Development Aid

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Abstract

Since the turn of the millennium, the major development agencies have been promoting "knowledge for development," "ICT for development," or the "knowledge economy" as new paradigms to prompt development in less-developed countries. These paradigms display an unconditional trust in the power of Western technology and scientific knowledge to trigger development—they taste of epistemic and technological determinism. This article probes, by means of a genealogy, how and when development cooperation began adhering to epistemic and technological determinism, and which forms this adhesion has taken over time. The genealogy shows, first, that knowledge and technology have always been integrally part of the very "development" idea since this idea was shaped during enlightenment. Second, while the genealogy reveals that epistemic and technological determinism were embedded in the development idea from the very beginning, it also illustrates that the determinism has always been challenged by critical voices.

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Introduction

Point four of President Harry Truman's inaugural address, pronounced on January 20, 1949, in front of the US Congress, has been indicated by many scholars as the emblematic milestone in—or even starting point of—international development aid.[1] Truman (1949) stated the following:

> [W]e must embark on a bold new program for making the benefits of our scientific advances and industrial progress available for the improvement and growth of underdeveloped areas. [...] For the first time in history, humanity possesses the knowledge and skill to relieve suffering of these people.

Nearly half a century later, the World Bank published the 1998/1999 World Development Report, entitled *Knowledge for Development*. The report opened with this statement:

> Knowledge is like light. Weightless and intangible, it can easily travel the world, enlightening the lives of people everywhere. Yet billions of people still live in the darkness of poverty—unnecessarily. [...] Poor countries—and poor people—differ from rich ones not only because they have less capital but because they have less knowledge. Knowledge is often costly to create, and that is why much of it is created in industrial countries. But developing countries can acquire knowledge overseas as well as create their own at home. (World Bank 1998, 1)

Although half a century lies in between the two statements, and although they stem from different institutions, the similarities are striking. Both quotes display an unconditional trust in the power of Western scientific knowledge and technology (K&T) to develop the "less-developed" countries. They display, in other words, a high degree of technological determinism.

Technological determinism has become an old-fashioned topic in the study of science and technology (S&T), since most scholars have dismissed this ideology, once and for all, as reductive (Wyatt 2008; Bijker 2010). This does not mean, however, that it is not with us in public discourses. Wyatt notices that technological determinism is overtly harnessed by public actors to justify or promote "particular directions of change" (Wyatt 2008, 175).

Such changes are exactly what the previously mentioned two quotes envisaged. So, although scholars have deconstructed and rebutted the technological determinist ideology in se, we still need to ask why and how it remains very present in public discourse.

This article seeks to understand the presence of technological determinism in development aid discourses. It will not retell the role of K&T in the development of civilizations (as in McClellan and Dorn 2006), nor their role in imperialist endeavors (as in Headrick 2010). Neither will this article analyze the practices and consequences of transferring Western K&T to the Global South through development cooperation (as in Escobar 1995; Mehta 2001; Anderson 2002; Wilson 2007). Instead, this article probes the origins of the Western idea that development is propelled by K&T. The genealogy of this idea necessarily begins at a time before there was talk of development cooperation. By reexamining landmark publications of influential thinkers (sixteenth to nineteenth century) and of the United Nations (UN) and the World Bank (twentieth and twenty-first century), the genealogy reveals how and when this idea became embedded in the paradigms that have dominated development cooperation.

The outline of the article is as follows. The next section summarizes what technological determinism means and extends it to epistemic determinism. The third section sketches a brief genealogy, from enlightenment to date, of the idea that K&T are fundamental in/for development. The fourth section discusses the genealogy.

On Technological and Epistemic Determinism

Before presenting the genealogy of K&T in/for development, it is necessary to clarify the concepts of technological and epistemic determinism, as they will provide the touchstone for the analysis of the genealogy. Critics have dissected technological determinism as an ideology that is based on two complementary assumptions (Wyatt 2008). First, it asserts that technology evolves independently from society, following its own inherent, linear, accumulative logic. Second, it assumes that this technological change drives—or determines—social change.

Although these ideas are deeply embedded in common explanations of change, historians and sociologists of S&T have resolved that there is not a unidirectional causal link between technological change and social change—as technological determinism suggests—nor does technology develop along its own inherent goal-directed path (Bijker 1995; Oudshoorn

and Pinch 2008). Society and technology coevolve in an intimate and complex way (Bijker 2010).

By analogy with technological determinism, epistemic determinism can be defined as the two-footed ideology that knowledge is an immaterial good whose production is independent of the social context, and that this immaterial good can be transferred, without much effort, to another social context where it will have meanings and effects similar to those in the original social context.

Like technology, all knowledge is produced and reproduced by humans. Therefore, social scientists now generally agree that knowledge is necessarily partial and profoundly connected with its specific social context. This idea was already present in the work of nineteenth-century continental philosophers such as Nietzsche ([1887]1967), but became more prominent after the postmodern turn, especially through the work of Haraway on "situated knowledge" (Haraway 1988). Claims of universality in knowledge production are now considered naive, and where they do appear, these claims can be deconstructed as strategies that seek to overrule competing sources of knowledge (Thompson 2001).

To summarize, whereas technological determinism does not acknowledge that technology and society coevolve, epistemic determinism does not recognize that all knowledge is socially and historically situated. So, when a development paradigm reifies K&T and ascribes them a particular role in a bid to prompt social change (or development), it verges on epistemic or technological determinism.

A Genealogy of K&T in/for Development

The following paragraphs retrace the key paradigms that invoked K&T for the sake of development. The first part reanalyzes the emergence of the development idea during enlightenment to understand the role enlightened thinkers attributed to K&T in development. The genealogy then unearths how this discursive link between K&T and development molded the inception of development aid at the end of the Second World War. The second and largest part of this section reexamines salient publications of the UN and the World Bank, from the 1940s until the 2010s, which invoke K&T as drivers of development.

The genealogy deliberately concentrates on the hegemonic paradigms of prominent thinkers (in the first part) and powerful development agencies (in the second part). Following a Nietzschean–Foucauldian approach, it describes the historical context in which these paradigms emerged and the subaltern paradigms that tried to counter them.

The Genesis of the "Development" Idea

The idea of development as linear, cumulative, and unlimited phenomenon is the brainchild of a Western world view that emerged during enlightenment (Escobar 1995; Rist 1996). It is closely related to the enlightened view on knowledge. Classical philosophers such as Aristotle saw nature as cyclic, developing through the stages of birth, growth, decline, and death, without ever reaching the perfect state. Christianity and Saint Augustine linearized growth and added a *telos* to development: everything was believed to develop according God's plan toward the inevitable end of the world (Rist 1996). However, there was no trace yet of the idea that knowledge, technology, and social organization develop in a cumulative manner. The knowledge produced by the classical Greek and Roman thinkers, for instance, preserved an insurmountable status until enlightenment (Rist 1996).

This idea remained influential until challenged by Bacon, Descartes, and Pascal in the sixteenth and seventeenth centuries. For example, Descartes stated around 1628 that "we should not give great credit to the Ancients on account of their antiquity [...] For the world is older now than it was then, and we have a greater experience of things" (Descartes 1964–1974, 204). Bernard le Bovier de Fontenelle wrote that "a great, savage mind is, so to speak, composed by all great minds of all preceding centuries; [...] mankind will never degenerate and the sane voices of all the great minds that follow will always add one to another" (Fontenelle [1688]1752). Knowledge started to be described as accumulative: every generation can benefit from the existing body of knowledge and can add its own bit to it. A decline in knowledge and science was believed to be impossible.

The supposed accumulative character of knowledge and its beneficial effects were contested by a minority of thinkers, including Jean-Jacques Rousseau, David Hume, and Adam Ferguson. Hume wrote that "when the arts and sciences come to perfection in any state, from that moment they naturally, or rather necessarily, decline, and seldom or never revive in that nation where they formerly flourished" (Hume [1752]1854, 146).

Despite the dissident voices, what is left by the end of the eighteenth century is the hegemonic idea of linear progress and infinite growth in our knowledge of the natural world and our power to control it through technology. This view nurtured a general acceptance of technological determinism. Indeed, all streams of thought in the eighteenth and nineteenth centuries—the enthusiastic as well as the critical—held that S&T were powerful agents of social change (Smith 1994). It was believed that if knowledge

accumulated then technology also accumulated, and socioeconomic organization would become more sophisticated.

The first enlightened voices that called to export to the colonies the advantages of European K&T invoked precisely Europe's epistemic superiority as justification. Condorcet, last of the *Encyclopédistes*—and a fervent critic of slavery—wrote in 1793 that:

> The Europeans [...] will disseminate, in Africa and in Asia, the European principles and example of freedom, of the enlightened, and of reason. [...] [The colonies] are just waiting for our help to become civilized, and are waiting to find brothers among the Europeans, in order to become their friends and *pupils*. (Condorcet 1795, 335, translation and emphasis by the author)

Apparently a teacher–pupil relationship—with Europe in the role of the teacher—was already part of the progress ideology by the second half of the eighteenth century.

The rise of social evolutionism in the nineteenth century molded Western thinking concerning development and development aid in an important way. All societies of this planet were believed to pass through a number of stages of evolution, from savagery to civilization. Moreover, the path was said to be universal, hence identical for all societies, and this created a unifying bond among all peoples. This also meant that the savage tribes in the colonies were believed to lead the life that our ancestors had led some millennia ago and that evolution would inevitably transform their society in a society similar to the European.

The successive stages of social evolution were characterized by increasing complexity in social organization, technology, and knowledge. In this sense, social evolutionism added two meanings to K&T in development. First, August Comte argued that human thought "passes successively through three different theoretical conditions: the theological or fictitious; the metaphysical, or abstract; and the scientific, or positive" (Comte [1830]1975, 71). As a consequence, Western society was presented to have superior knowledge—in an absolute manner—with respect to non-European societies, since Europe was in the utmost advanced stage of evolution. Second, the type of K&T that a society possessed, such as its agricultural techniques, tools, or writing system, was a measure of the evolutionary stage it found itself in (as in Morgan [1877]1974).

By the nineteenth century, Europe felt a new urge to colonize (the Scramble for Africa), in particular to find new markets for the expanding European industry (Arndt 1987). Social evolutionism, disguised as

philanthropy, was a helping hand in selling the new colonialism to the public. For instance, Jules Ferry, French Minister of External Affairs at the end of the nineteenth century, believed that "superior races have rights over inferior races, because they also have obligations towards them; they have the obligation to civilize the inferior races" (Ferry 1885, translation by the author).

It needs to be underlined that the objective of civilizing the "inferior races" was, at that time, still completely detached from the idea of stimulating their economic development (Arndt 1987). Economic development was only reserved for European economies.

Social evolutionism was also reflected in the philosophy behind the League of Nations founded in 1919. The Covenant of the League of Nations is the first multilateral agreement that mentions the concept of development and the idea that nations and peoples can develop over time. Article 22 of the Covenant, which regulated the Mandatories (i.e. mandated control) of some member nations over others on behalf of the League, defended these Mandatories in terms of the different stages of development that nations found themselves in.

President Harry Truman, whose inaugural address of 1949 has been partly cited in the introduction of the article, distinguished developed from underdeveloped countries in a more clear-cut way than the League of Nations did. The developed people needed to help the underdeveloped in their economic development, Truman stated. The scope: maintaining world peace. The means: the transfer of scientific knowledge and industrial technology.

By proposing such a transfer as a trigger of development, Truman merely expressed the spirit of the times. Landes (1998, 501) recalls the British groundnut scheme, implemented in Tanganyika over the period 1946–54, as "the mother" of all technology transfer projects. This program had to show what the British government was capable of when it implemented modern Western technology and expertise in their colonies. Although the peanuts were destined for the British market and not for the African, it was argued that the local farmers would learn from the large-scale industrialization in agriculture and successfully copy it. This is the context in which the idea of Technical Assistance (TA) emerged.

From TA to Capacity Building

Through 1947 and 1948, the term technical assistance was coined to indicate the official help that was offered by the UN Economic Affairs Department. In 1949, under impetus of Truman's point four, an Expanded

Program of TA was created (which in 1965 became the UN Development Programme [UNDP]). TA was initially a program of unidirectional knowledge transfer, in the hands of Western experts and colored by evolutionist thinking. Local knowledge or traditions were seen as obstacles, "rapid economic progress is impossible without painful adjustments. Ancient philosophies have to be scrapped; old social institutions have to disintegrate" (UN 1951, 4). The TA program of the UN and loans of the World Bank were aimed at offering "tech-fix" assistance and giving "the big push" to underdeveloped countries, mostly in the form of large infrastructure and technology works, in an attempt to start weaving the network of economic activity. Social well-being would follow automatically.

The absolute power of Western S&T, and the conviction that this scientific knowledge was a global good, still set the tone in 1963 at the first UN Conference in Geneva on the Application of S&T for the Benefit of the Less Developed Areas. The conference was taken as a scientific rather than a political meeting. Scientists and technical experts dominated the Geneva conference, 84 percent of them coming from the developed world (Standke 2006).

Surprisingly, David Owen, Chairman of the UN Technical Assistance Board and generally well aligned with the US government, anticipated already in 1950 much of the criticism of TA that would grow in the 1960s and 1970s:

> An economic mission from any one of the great industrial powers, no matter how benevolent the intentions, may [...] be met with charges [...] that its purpose is to bring the country under some form of *foreign economic domination* [...] Moreover, even if the good intentions of the mission are fully appreciated, there remains the danger of a one-sided approach to the solution of the technical problems which the mission encounters. It is only natural that technical experts from any one country will be inclined to recommend a duplication of the institutions, organization, and techniques which have proved successful in their own country, though in many cases these solutions are *not necessarily compatible with the social and political structure of the recipient*. (Owen 1950, 110, emphases by the author)

The discussions about TA, anticipated by Owen but growing widespread throughout the 1960s, mostly evolved around the effectiveness of TA. They did not question the epistemological premises of the unidirectional transfer of K&T from the West to the underdeveloped world.

Criticism culminated in the late 1960s with the emergence of the Dependency School, a group of critical scholars and policy makers based in Latin

America (e.g. Frank 1969). They argued that the "center" of the world (the West) had developed at the expense of the "periphery" (the ex-colonies). They blamed development assistance for perpetuating this unequal relationship and technology transfer for creating dependency.

With the appointment of Robert McNamara as the President of the World Bank in 1968, attention began to shift from the needs of economic growth to the needs of the very poor. Although the agencies continued to finance large infrastructure to some extent, the World Bank and UNDP began to be primarily concerned with rural development, poverty alleviation, and the reinforcement of local organizations. The development support was increasingly directed to grassroots development (Nolan 2002).

One expression of this attention to the poorest was the search for new forms of "appropriate" or "alternative" technologies, more adaptable to the local contexts in underdeveloped regions. In the early 1970s, Schumacher (1973) and others elaborated on the idea of "intermediate technologies" for development: technologies that float somewhere between traditional village techniques and advanced capital-intensive technologies of the Western world. The term was soon replaced by "appropriate technologies," indicating any technology that is small scale, labor intensive rather than capital intensive, energy efficient, environmentally sustainable, and controlled and maintained by the local community of a developing region (Murphy, McBean, and Farahbakhsh 2009). The concept of appropriate technology and some sensibility of local knowledge were gradually adopted in the World Bank models of technology transfer (Visvanathan 2001), in order to improve the technology transfer. There was no attempt yet, within the development agencies, to question the transfer itself.

It should be noted that the attention to the rural poor in the late 1960s was not entirely new. The Green Revolution of the 1960s and 1970s was based on research that was already started up in the 1940s by the Rockefeller and Ford foundations. However, their early attention to the food security of the poorest—also surfacing in Truman's speech—mostly stemmed from a concern about the rise of communism. Secure food production, it was said, was essential to keep the poor rural populations in developing countries "happy" and keep them away from communism (Ross 2003).

In any case, until the late 1960s the main scope of development aid was, without doubt, economic growth and the production of material goods. Along with economic growth, rural poverty would decline. Only toward the end of the 1960s, the rural poor came to the center stage of development programs. In the late 1960s and throughout the 1970s, the world also witnessed the increasing bargaining power of the developing countries

themselves—the so-called "nonaligned" countries—at the international political stage (Rist 1996). In addition to a New International Economic Order they demanded better access to S&T.

The World Plan of Action for the Application of Science and Technology for Development, presented in 1971 by the UN Advisory Committee on Science and Technology for Development (ACAST), reflected this new political climate by proposing the following targets (UN 1971):

- developing countries should increase their domestic S&T output;
- developed countries should intensify their aid to build up the S&T capacities in developing countries;
- a portion of the R&D in developed countries should be focused on the specific needs of developing countries.

The instrumental and deterministic role attributed by ACAST to scientific output was criticized by a group of scholars in the Sussex Manifesto (Singer et al. 1970)—a document that was initially meant to be the introductory chapter of the World Plan of Action. The Sussex Group left behind all discourses about "catch-up" or about "the troubles in technology transfer." Instead they argued that development was about improving the local capabilities[2] (Shah 2009). They contended that development "depends on people with outlook, knowledge, training and equipment to solve the problems posed by their own environment, and thus control their environment rather than be controlled by it" (Singer et al. 1970). It is noteworthy that the radical Manifesto still sustained "economic production" as ultimate aspiration for the developing countries.

In 1979, the UN organized a second Conference on Science and Technology for Development in Vienna. Unlike the first one in Geneva, this conference was political, rather than technical, and participants were governments, not scientists. Under pressure from the nonaligned countries, the discussions were more about the equitable access to S&T rather than about K&T transfer as such (Standke 2006). Despite this shift in attention, discussions about equitable access still adhered to the mainstream philosophy that any injection of S&T would lead to development. Critical voices questioning Western S&T were kept out of the conference (Shah 2009).

While the UN made strong efforts to give the field of S&T a highly visible role in its deliberations during the 1960s and 1970s, today the UN is no longer seen as a prime actor in this field (Standke 2006). The General Agreement on Tariffs and Trade (GATT) and the World Trade Organization

(WTO) have taken over the negotiations about access to S&T. This transfer of competences gradually happened during the 1980s, when the world witnessed the rise of the neoliberal ideology and its commitment to the benefits of market liberalization for developing countries. Scientific K&T were increasingly considered "a commodity that can be traded like many others" (World Bank 1987, 64)[3]. Ambitious renegotiations of the GATT, known as the Uruguay round, started in 1986 and eventually led to an extension of international Intellectual Property Rights and to the establishment of WTO in 1995.

While the 1980s' neoliberal theory attributed an exogenous role to S&T in growth, the 1990s' New Growth Theory endorsed the endogenous role of knowledge in economic growth (Romer 1993). By the end of the 1990s, the primary recommendation of the development agencies to developing countries was to increase the national human capital in a bet to generate growth from knowledge-related activities in the global "Knowledge Economy" (Cozzens et al. 2008). The 1998/1999 World Development report *Knowledge for Development* (World Bank 1998), whose opening statement was quoted in the introduction of this article, was imbued with this knowledge economy paradigm.

Rooted in another strain of thought, but closely related to the knowledge economy paradigm, was the theory of innovation systems (Freeman 1982; Edquist 1997 among others). This theory positioned the generation of science, technology, innovations, and development within a network of interrelated actors: the innovation system. The three typical categories of actors in an innovation system are research institutions (both public and private), governmental bodies, and private enterprises (Edquist 1997). The concept reflected an important shift in the understanding of technological production: the linear chain of invention–innovation–diffusion has been replaced by a dynamic process of nonlinear learning between multiple agents. Development policies that adhered to the innovation system theory sought to identify and promote the political configurations and strategic investments that are needed to initiate or accelerate the process of innovation and technological development.

Innovation systems have the merit of drawing attention to the wider and plural milieu of knowledge production. Whereas TA was still primarily concerned with one-to-one knowledge transfer, innovation systems made clear that the actual dynamic of knowledge production is many to many (Wilson 2007).

When Wolfensohn was appointed President of the World Bank in 1996, he declared that the Bank had to become a Knowledge Bank (Wolfensohn 1996):

> We have been in the business of research and disseminating the lessons of development for a long time. But the revolution in information technology increased the potential value of these efforts by vastly extending their reach. [...] We need to [...] enhance our ability to gather development information and experience, and share it with our clients. We need to become, in effect, the Knowledge Bank.

The 1998/1999 World Development Report, an immediate product of this new line of thought, combines elements of knowledge economy, knowledge management, and Information and communications technology (ICT) for development.

Knowledge management aimed to convert the tacit knowledge of individual experts or employees into explicit, manageable knowledge (Evers, Kaiser, and Müller 2009). King and McGrath (2004) distinguished two tendencies. The first or "technological" approach was the one that tried to capture, store, and distribute by means of ICT the knowledge that already existed among experts in an organization. The second or "social" approach focused more on putting people together in teams, in order to take advantage of their tacit knowledge.

Wolfensohn, by stating that the World Bank must become a Knowledge Bank, clearly harnessed the technological approach. For this purpose, the World Bank created the Global Development Network with a public web portal, the Global Development Gateway, that collects and disseminates development-related knowledge on topics as varied as economics, AIDS, natural resources management, and so on. UNDP created a similar system called SURF (Evers, Kaiser, and Müller 2009).

The knowledge management credo placed much hope in modern ICTs. However, ICTs have been invoked for development in many different ways:

- development-related knowledge can be transferred via the internet or satellite, "at virtually no cost" (World Bank 1998, 130);
- ICT will bridge the digital divide between the "information rich" and the "information poor" in order to instruct the information poor and empower their civil society and;
- ICT as instrument or as economic good in the knowledge economy.

The first has been discussed before in the context of knowledge management. The second and third usually constitute the "ICT for Development" (ICT4D) paradigm. The ICT4D sector has an ambiguous relationship with technological determinism. Mansell (2011) claims that the grand ICT4D

theories of the UN and World Bank rely on ICT as an exogenous factor for development. Although the 2001 Human Development Report (UNDP 2001) stated that ICT "enable development" because technological innovation and development are "mutually reinforcing, creating a virtuous circle" (UNDP 2001, 28), Avgerou (2003) finds that the report emphasizes by and large only one side of that virtuous circle: that ICT innovation will generate development.

The hopes for the ICT4D sector are high, but many projects fail. The literature on ICT in developing countries has accumulated a substantial amount of qualitative data that confirms the situated manner in which ICT4D projects need to take shape (Avgerou 2003). Practice-based approaches in the field show that ICT can play an endogenous role in development but such initiatives cannot adequately bridge power inequalities (Mansell 2011).

Throughout the 1990s, the capacity-building paradigm emerged as an important opposition to any practice of deterministic K&T transfers in development—TA in particular. From the 1940s through the 1970s, TA had exclusively relied on the employment of Western experts, and its failure was no longer ignorable by the end of the eighties. Criticism to TA was growing within the major development organizations themselves (for an overview, see Fukuda-Parr, Lopes, and Malik 2002). A UNDP assessment report (Berg and Seymour Whitaker 1993) argued that TA had proven effective in getting the job done, but less effective at developing local institutions or building local "capacities". Instead, TA had fostered dependence on foreign experts and had distorted national priorities.

The concept "capacity building" was picked up from this report by Edward V. K. Jaycox (1993), the Then Vice President of the World Bank's Africa section. Berg and Jaycox's message was that TA had to rely much more on local expertise, not on foreign experts. In this way, TA would stimulate and build up the local capacities.

A subsequent UNDP publication (Fukuda-Parr, Lopes, and Malik 2002) was the real driver for the spread of the capacity-building paradigm in all development agencies. The document completely rejected TA and proposed capacity building as the "new solution to old problems." Fukuda-Parr, Lopes, and Malik (2002) argued that capacity needs to be developed at three levels: the individual, the organizational, and the societal. In fact, the agency of an individual or organization to apply its capacities depends on the capacities of the society as a whole. In other words, the document explicitly recognized that knowledge is always embedded in a specific social context.

Since the 1990s, the capacity-building paradigm has gained hegemonic status within development cooperation (Kühl 2009). It is not surprising that the concept, which is on the lips of most development actors nowadays, has acquired multiple and often conflicting meanings (Baser and Morgan 2008; UNDP 2009).

Discussion

Disentangling the Different Paradigms

The idea that K&T can infinitely cumulate and become infinitely more complex emerged during enlightenment. Enlightenment also planted the seed of the idea that the complexity of K&T is *endogenous* to the increasing sophistication of societies. This idea matured in the form of social evolutionism, with Western scientific knowledge seen as the expression of the most advanced evolutionary stage a society could attain. Condorcet, through the nineteenth-century colonizers, to the League of Nations all invoked the superiority of Western knowledge and civilization as moral justification to civilize the "inferior races."

The role that Truman and TA assigned to K&T was radically different: it had to tackle the economic poverty of the underdeveloped world and harness Western K&T as *exogenous* tools for the generation of economic growth. Industrial technology and large infrastructure would generate economic development. The (scientific) knowledge surrounding these Western technologies was embodied by the Western experts who were sent out for TA. There was a heavy focus on the transfer of technologies, but there were no particular efforts to foster knowledge production in the beneficiary society itself. Knowledge as endogenous factor of development seemed to be abandoned in favor of material production as endogenous motor of development.

Since the late 1990s, knowledge has again assumed an *endogenous* role in development, as can be deduced from the rise of the development paradigms related to the knowledge economy, innovation systems, or capacity building. By extension, other recent paradigms, like ICT4D, harness technology as an *instrument* in development rather than *goal*, and confirm that the focus is now on knowledge as endogenous factor in development.

Moreover, K&T have been invoked for development with varying *intentions*. In the pre-Truman era, they were invoked for the civilization of the colonies. During the 1950s and 1960s, they were invoked for producing goods and economic growth. In the 1970s, the role of K&T was to alleviate

poverty. Today K&T are said to empower the people and to reinforce their capacities, while others see them as the motor in a knowledge economy.

It is important to emphasize that different paradigms for K&T in/for development have existed alongside each other. Some of these paradigms are mutually supportive while others convey completely opposite messages. This is especially true in the first decades of the twentieth century. When scrutinizing the credo "*Knowledge for Development*," brought forward by the 1998/1999 World Development Report (World Bank 1998), we note that this flag covers a number of different cargoes. It includes elements of the knowledge economy, innovation systems, knowledge management, and ICT4D paradigms. UNDP, from its side, also supports ICT4D and online knowledge management initiatives, but it is also a strong promoter of capacity building. Finally, the genealogy of the third section shows that at any point in history the reigning paradigm was always contested, to some minor or larger extent, from inside or outside the authoritative organizations.

Epistemic and Technological Determinism

As explained previously, the technological determinism ideology ignores the intense coevolution of technology and society, whereas the epistemic determinism ideology ignores that all knowledge is situated and embedded in its particular social context. Apart from the different roles that have been assigned to K&T in or for development, the degree of epistemic and technological determinism in the interpretations has also varied widely. Some paradigms are particularly prone to epistemic and technological determinism, such as TA, the ICT4D, knowledge management, and knowledge economy paradigms. That does not mean that they are imperatively deterministic. More and less deterministic views exist along each other.

Table 1 summarizes the roles that have been attributed to K&T in or for development and gives a rough indication of the degree of epistemic/technological determinism (ep/tech det):

- K&T presented as totally detachable from the social context (indicated as "total");
- K&T presented as detachable from the social context, but some adaptation to the local context is inevitable (indicated as "high");
- K&T presented as embedded in the social context, but the paradigm still relies on the idea that one party can/should learn from the other (indicated as "low");

Table 1. The K&T Paradigms and Their Characteristics.

Period	Perspective	Role of K&T in development	Final goal	Degree of ep/ tech det
Cent. XVII	Enlightenment	K&T endogenous	Civilize	Total
Cent. XIX	Evolutionism	K&T endogenous	Civilize	Total
1940s–60s	Technical Assistance	T exogenous	Economic growth	Total
1970s	Poverty Reduction	T exogenous	Alleviate poverty	Total
	Appropriate Technologies	T exogenous	Alleviate poverty	High
	S&T for Development	K&T exogenous	Economic growth	Total
	Sussex maniphesto	K&T endogenous	Economic growth	Low
1980s	Neo-liberalism	T exogenous	Improve productivity, economic growth	Total
1990s–2000s	New Growth	K&T endogenous	Economic growth	High
	Innovation Systems	K&T endogenous	Economic growth	Low
	Knowledge Management	K endogenous	Economic growth, alleviate poverty, empowerment	Total
	ICT4D	K&T exogenous or endogenous	Economic growth	Total
	ICT4D	K&T exogenous or endogenous	Empowerment	High
	Capacity Building	K endogenous	Capacity, empowerment	Low
	Co-learning	K endogenous	Capacity, empowerment	None

Note: Cent. = century; K = knowledge; T = technology; S = science; ICD = information and communications technology; ICT4D = ICT for development; ep/tech det = epistemic/technological determinism.

- K&T presented as completely embedded in the social context; transfer makes little sense, as learning and innovation must happen in the social context (indicated as "none").

Beyond Capacity Building

Little has been said about *whose* K&T counts. All hegemonic development paradigms described previously favor Western K&T. Capacity building does try to harness local expertise in order to build up local capacities, but Wilson (2007) remarks that capacity building—like TA—still focuses on "learning things that are already known by one of the actors." Wilson distinguishes "learning from" and "learning with." The former still reigns within development aid, while there is a need to focus more on the latter. Co-learning paradigm is inspired by Habermas' ideal speech situation, where different forms of knowledge are equally valued as possible sources of creative learning and new knowledge production (Wilson 2007). Co-learning would be a mode of cooperation that fully transcends epistemic determinism.

Conclusion

The article shows that epistemic and technological determinism, although rebutted by historians and social scientists, is still very present in public discourses. The public discourse scrutinized in this article is international development, for it attributes particular roles to K&T as triggers for development in the Global South.

By reexamining four centuries of development thinking, the article shows that enlightenment shaped the idea that increasingly sophisticated K&T produce development. This idea was then implanted in the various civilization aid and development aid paradigms.

The genealogy also shows that the entire history of civilization aid and development aid is characterized by a long struggle of trying to find the right role for K&T. From the enlightenment until today many different roles have been allotted to K&T in or for development: exogenous to development, then endogenous; the instrument, and then the goal. K&T are also invoked for different purposes: for civilizing the "inferior races," as the engine of economic development, for poverty alleviation, and for empowerment. As a result of this long quest, deterministic and less deterministic interpretations have alternated each other, often existed along each other, and have often been repeated. The arguments put forward by the promoters of capacity building, for instance, bear many similarities to the criticism

issued in the early 1950s against TA, when the latter was still in its phase of inception.

Covering a vast genealogy of K&T in or for development in a short article can only aim at putting the question of technological determinism back on the agenda of S&T studies. Hopefully the article convincingly showed that both technological and epistemic determinism are still very much relied on by public actors, in particular in the field of international development.

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Notes

1. "Development aid" and "development cooperation" are used interchangeably in this article, but they need to be distinguished from "development." Development is an ideology about socioeconomic change that (loosely) draws inspiration from changes occurring in the Western world. Instead, development aid or development cooperation can be defined as the actual ensemble of the actors and interactions, financial and material flows, and policies and practices, that aims at achieving this socioeconomic change.
2. The Sussex Manifesto extensively wields the word "capability," a concept that became notorious a decade later through the work of Amartya Sen (1985). In the Sussex Manifesto, the concept is used only to refer to S&T capabilities.
3. The original text reads, "Much of the unprecedentedly rapid development of large parts of the world economy in recent decades is due to advances in technology [. . .] These advances can be reproduced for a fraction of the cost borne by the industrial countries that devise them [. . .]. Often technological knowledge

is *a commodity that can be trade [sic] like many others*, but it has some peculiarities which [. . .] are frequently used to justify public intervention."

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