Knowledge Machineries and Their Objects of Expertise. Knowing Bodies, Moves, and Moods through "Mobile Health" Data

Annabelle Littoz-Monnet
Geneva Graduate Institute, Switzerland

This article argues that the politics of socio-material objects should be examined in relationship with the machineries of knowing these objects are embedded in and also sustain. Objects of expertise are embedded in discursive constructs, material infrastructures, and relationships that "surround" and permeate their production. In turn, such objects give traction to the machineries of knowing that enable their emergence. The article uses the concept of "knowledge machinery," coined by sociologist of science Karin Knorr-Cetina, to denote a focus on the "machinery" and its "parts" at the same time, or to the "macro" and the "micro," as highly intertwined and mutually reinforcing in processes of knowledge production. The article explores these questions in the context of global health governance, with a specific focus on the politics of mobile health and the data it generates, conceived as an object of expertise of its own kind. It shows, first, that mobile health data have specific characteristics and claims attached to them; they are, in themselves, the turning of bodies and lifestyles into standardized and fully mobile "data units" that feed into data flows. As such, they produce ordering, norming, and governance effects, which do not disrupt but sustain the knowledge machinery of global health.

Este artículo argumenta que las políticas relativas a los objetos socio-materiales deben examinarse en relación con las maquinarias de conocimiento en las cuales están integrados y que, a su vez, las sostienen. Los objetos de la experiencia se encuentran insertados dentro de las construcciones discursivas, las infraestructuras materiales y las relaciones que "rodean" e impregnan su producción. A su vez, tales objetos dan tracción a las maquinarias del conocimiento que permiten su aparición. Este artículo utiliza el concepto de "maquinaria del conocimiento", acuñado por la socióloga de la ciencia Karin Knorr-Cetina, con el fin de denotar un enfoque hacia la "maquinaria" y hacia sus "partes" al mismo tiempo, o a nivel "macro" y "micro", tratándose de aspectos que están altamente entrelazados entre sí y que se refuerzan mutuamente en los procesos de producción de conocimiento. El artículo estudia estas cuestiones en el contexto de la gobernanza de la salud mundial, con un enfoque específico en las políticas de salud móvil y en los datos que esta genera, concebidos como un objeto de experiencia por sí mismos. En primer lugar, el artículo demuestra que los datos de salud móvil tienen características específicas y reivindicaciones asociadas a ellos. Por tanto, estos representan, en sí mismos, la transformación de los cuerpos y los estilos de vida en "unidades de datos", estandarizadas y totalmente móviles, que alimentan los flujos de datos. Como tales, producen efectos en materia de ordenación, normalización y gobernanza, que no perturban, sino que sostienen, la maquinaria del conocimiento de la salud mundial.

Cet article affirme que la politique des objets sociomatériels doit être examinée au vu de la relation qu'elle entretient avec les machines de connaissances dans lesquelles ces objets s'insèrent et qu'ils entretiennent. Les objets d'expertise sont intégrés dans des constructions discursives, des infrastructures matérielles et des relations qui ≪ entourent ≫ et imprègnent leur production. À leur tour, ces objets donnent un élan aux machines de connaissances qui permettent leur apparition. L'article emploie le concept de ≪ machine de connaissances ≫, créé par la sociologue des sciences Karin Knorr-Cetina, pour indiquer une double focalisation sur la ≪ machine ≫ et ses ≪ pièces ≫, ou encore sur le ≪ macro ≫ et le ≪ micro ≫, du fait de leur haut niveau d'enchevêtrement et de leur renforcement mutuel au sein des processus de production de connaissances. L'article s'intéresse à ces questions dans le contexte de la gouvernance sanitaire mondiale, en se concentrant plus particulièrement sur la politique de la santé mobile et les données qu'elle génère, appréhendées tel un objet d'expertise d'un genre propre. D'abord, il montre que les données de santé mobile possèdent des caractéristiques spécifiques, et s'accompagnent aussi de revendications. Elles représentent, en elles-mêmes, la transformation des corps et modes de vie en ≪ unités de données ≫ standardisées et entièrement mobiles, qui alimentent des flux de données. En tant que telles, elles produisent des effets sur l'ordre, les normes et la gouvernance, qui ne perturbent pas, mais entretiennent, la machine de connaissances de la santé mondiale.

Introduction

"In many places, people are more likely to have access to a mobile telephone than to clean water," says the World Health Organization (WHO) on the webpage of its Be He@lthy, Be Mobile initiative.[1] Given the massive number of mobile phone subscriptions throughout the world, mobile phones do seem to have the potential "to transform the face of health service delivery across the globe." Mobile health (mHealth) technologies hold the promise of supporting healthcare providers in preventing diseases, disseminating recommendations for "health lifestyles," and promoting stronger adherence to treatments. The WHO and the International Telecommunication Union (ITU) have, thus, jointly launched the initiative Be He@lthy, Be Mobile in 2012, in the hope that mHealth technologies can be developed throughout the globe and "influence behavioural change and positively impact health and well-being" (WHO and ITU 2022a, 10). mHealth devices, such as mobile apps, chatbots, text messaging, and so on, indeed make it possible to *directly reach people* and provide them with health guidance,

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[1] "Be He@lthy, Be Mobile." World Health Organization, accessed November 6, 2023, https://www.who.int/initiatives/behealthy.

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while simultaneously *inducing them to self-track* their health conditions and lifestyles. From measuring one's own glucose levels, daily amount of activity and sleep, or yet sugar and salt intake, mHealth technologies offer endless possibilities for mHealth users to "monitor" their health and lifestyles.

As part of the joint Be He@lthy, Be Mobile initiative, the WHO and the ITU have been developing stylishly labeled programs, mAgeing, mCervicalCancer, mHypertension, mDiabetes, mBreatheFreely (for asthma and respiratory diseases), mTBTobacco (for tuberculosis and tobacco) and the soon to be ready mSmartLife. All these programs aim to support the development of mHealth technologies in the WHO's member states. The WHO/ITU place, in particular, great hopes in the new possibilities emerging from the generation of mHealth data, which are produced and captured as people engage and interact with mobile phone apps, chatbots, and text messages. mHealth data have become valued "objects of expertise" (Esguerra 2024, this forum), associated with the promise of more profuse, accurate, and instant knowledge, which will render healthcare delivery more effective and improve health surveillance and the monitoring of health interventions. The generation of mHealth data has, thus, been presented as a rational, technical, and neutral response to health needs.

The data created through the devices of mHealth are, however, neither neutral nor inert. mHealth and its data are strongly embedded in specific logics, where health problems are entirely quantifiable, solvable by people themselves, with the help of technologies, seen as the solution to all ills. Once created, assembled, and aggregated, mHealth data also create effects on the way health is understood and governed. Thus, I explore here two strongly entangled questions. First, in what kind of politics are mHealth data embedded? Second, what kind of politics do such data, in turn, produce?

Addressing these questions necessitates more than "just" following the data alone. Existing insights in Science and Technology Studies (STS), anthropology, and International Relations (IR) tend to focus on the autonomous lives of artifacts and the way they produce a multiplicity of meanings and political effects (Leander 2013; Aradau and Blanke 2017; Finiguerra 2023). Such insights have, as a result, primarily focused on the performative effects of objects. I argue, here, that we need to examine immediate socio-material practices of knowledge-making and the role of socio-material objects therein *in relation to* the "knowledge machinery" within and through which they are produced in order to better grasp the political economic logics of knowledge artifacts. Doing so makes it possible to see the role of asymmetries and resources in relation to the production and lives of socio-material objects. A "knowledge machinery" consists of what Knorr-Cetina calls "macro-epistemics," the ensemble of institutional arrangements, discursive constructs, material infrastructures, and relationships that "run on knowledge and expertise" (Knorr Cetina 1999, 8; Knorr-Cetina 2007). Such machineries enable and shape the production and validation of knowledge; they produce "objects of expertise," knowledge objects endowed with authority, which are part of the everyday and mundane knowledge apparatus through which the problems of global governance are understood and governed. In turn, the knowledge produced and validated through such machineries gives them traction. I use, thus, the concept of knowledge machineries to denote a focus on the "machine" within and through which knowledge is produced, as well as its "parts" at the same time. Doing so also shows how the "macro" and the "micro" are highly intertwined in processes of knowledge production.

Thus, mHealth data are embedded in the political economic logics of the knowledge machinery of global health and also largely sustain it. The knowledge machinery of global health has become increasingly dominated by market logics, the presence of private sites of knowledge production, and the spreading out of digital techniques of data collection and assembling. Private companies, large consultancies, philanthropic foundations, and public–private partnerships have become everyday sites of global health governance. They partner with the WHO, develop their own programs, and produce data, policy advice, and research that are being used to govern health problems (McCoy, Chand, and Sridhar 2009; Reubi 2018; Eckl and Hanrieder 2023; Littoz-Monnet and Osorio Garate 2023). The privatization and digitalization of health governance have been largely entangled; problems are now known and made sense of through big data, algorithms, and dashboards, which are increasingly produced by private companies, philanthropies, or in partnership with them (Aradau and Blanke 2017; Flyverbom, Madsen, and Rasche 2017; Tichenor and Sridhar 2020). mHealth, perceived as a clear "investment opportunity," has largely attracted private actors, which fund programs in the field, but also design the technological devices of mHealth (WHO and ITU 2019b, 6).[2] This specific machinery of knowing has rendered possible the emergence of mHealth and its data as a way of governing public health; in turn, the properties of mHealth data, as well as the promises they are associated with, can only be understood as part and parcel of this broader machinery.

MHealth data, as objects of expertise, have distinct features, which can only be captured while examined as part of the broader socio-material construct they belong to; mHealth data are, first, a *turning of bodily conditions, lifestyles, and moods into data.* They are embedded in a vision of health where pathologies and even moods can be turned into numbers that feed into data flows. Second, mHealth data are also *continuously being generated* as people engage with their health apps to self-track their own health and activities. This incessant process of data generation relies on the engagement of the "responsible digital user," who aims at reaching "the right numbers." As such, it fashions people as answerable for their own health, an approach that clearly "aligns with the neoliberal health perspectives" (Rich and Miah 2017, 87). Third, mHealth data are conceived as fully *mobile and interchangeable units*, meant to circulate "seamlessly" in an "interoperable digital ecosystem" used by the health community across all settings, so as to become accessible from anywhere. This is embedded in a vision where health is decontextualized, and the same solutions are expected everywhere. It also reflects ideational constructs where technologies are the solution to better and more "cost-effective" healthcare.

mHealth data reflect specific political logics, but also produce ordering, norming, and governance effects. As mHealth data feed into large data flows used for prioritizing global health interventions, they produce, first, *new kinds of relationships* between individuals, health centers, and health governors. This creates a form of ordering where program designers and their partners have at their disposal a data stack, which they can use to monitor that

[2] "Be He@lthy, Be Mobile." World Health Organization, accessed November 6, 2023, https://www.who.int/initiatives/behealthy. "Sanofi joins WHO-backed diabetes mHealth programme." PMLiVE, accessed November 6, 2023, https://www.pmlive.com/blogs/digital_intelligence/archive/2015/february/sanofi_joins_who-backed_diabetes_mhealth_programme_664300.

people follow the norms set. Second, mHealth data produce *normed bodies and lifestyles*, where individuals are engaging in the self-streamlining of their selves as they try to reach the "ideal" numbers set by health governors. Finally, as mHealth data are continuously being generated and captured, holding the promise of providing health staff and health governors with profuse and continuous knowledge, they further sustain a *mode of governing as a continuous adjustment and "response" to data*. The qualities of mHealth data thus justify a data-based governance narrative, where data are increasingly essential and the possession of data becomes itself the solution to problems. This mode of governing also fashions technologies as the solution to better, cheaper, and more "cost-effective" healthcare; in so doing it further sediments the presence of private companies, as the designers of apps and providers of technological devices without which mHealth cannot operate. mHealth and its data are therefore sustaining the knowledge machinery within and through which they are produced.

This article is based on in-depth case study research. Through immersion with the details of the case, I have mapped the knowledge machinery of global health and its core object of expertise: the data generated through the devices of mHealth. I have done this by switching between zooming in and zooming out (Nicolini 2009). While zooming out, I have paid attention to the machinery as a whole, with a particular focus on its sites, ideas, relationships, and technological infrastructures. While zooming in, I have observed the politics of mHealth data, paying attention to the claims attached to this specific material artifact by the WHO, the ITU, and their private partners. I have also observed their performative effects, on the norming of individuals, the relationships they produce, and the modes of governing they induce. I have attempted to "[strive] for the nearest possible vantage point to study a given problem," collecting data eclectically from a disparate array of sources in different ways (Gusterson 1997). I have examined policy documents of the WHO and the ITU on mobile health, as well as digital health more generally, the website of Be He@lthy, Be Mobile, as well as those of all of its sub-initiatives, partnership projects, and so on. I have also consulted the websites of Google Fit and Sanofi, two WHO partners for mHealth. Third, this was done through a careful analysis of the objects of expertise themselves, with a particular focus on their form and the kinds of knowing they made possible.

Artifacts and Infrastructures in Global Governance

Scholarship in the field of IR has recently been catching up with insights already well established in STS, sociology, and political economy on the significance of materiality in the study of knowledge and its politics. The effects of material objects have, recently, been more widely recognized, as algorithms, models, and tools of cyber surveillance visibly "act" autonomously. The material has, however, always been ubiquitous in our lives, for, as put by Latour, "Society is not made up just of men, for everywhere microbes intervene and act" (Latour 1988, 35).

On the one hand, scholars across disciplines have examined the production, circulation, and effects of knowledge artifacts, whether the microscope, maps, or more recently the metrics through which International Organizations (IOs) "know" social reality. Such artifacts, what Latour called "inscriptions," are highly portable and endlessly reproducable. As they circulate, texts, for instance, serve to stabilize and naturalize facts (Latour and Woolgar 1979; Gieryn 1999). Knowledge artifacts function as "durable, more mobile traces which can be transported between locales" (Latour 1987; Walters 2002, 91). They do not only "represent" cultures, ideas, and discourses. They also "mediate ties between humans" over a long time and large distances and as such make transportable and perpetuate certain ways of knowing (Star 1999). Thus, knowledge objects have been shown to have their own "lives," as they travel and are used in ways that produce a multiplicity of meanings and political effects (Leander 2013; Aradau and Blanke 2017; Finiguerra 2023).

Not all knowledge artifacts are materially bounded in the same way. Data, metrics, or estimates are not "materially bounded in the ways that drones, tanks, bodies, and boats are" (de Goede 2018, 31). Rather, they acquire materiality and stability in a more processual fashion, as they circulate, are reproduced, and become performative (Knorr Cetina 2001). Knowledge objects, thus, are characteristically open, question-generating, and complex. They are processes and projections rather than definitive things (Knorr Cetina 2001, 190). The data created through mHealth technologies are processual "objects of expertise" (Esguerra 2024, this forum) that become meaningful as they are captured, assembled, and acted upon. Their processual and somewhat open-ended nature makes the study of the socio-material arrangements within and through which they are produced, stabilized, and used, all the more necessary to grasp their politics.

Another related strand of scholarship in STS and anthropology has, indeed, shifted away from a focus on knowledge artifacts, toward that of "infrastructures" (see Bueger and Stockbruegger 2024, this forum; Leander 2024, this forum). Infrastructures have been understood as material systems, which include "things," such as cables, pipes, or oceanic monitoring systems, as well as the relationships between them (Star and Ruhleder 1996). Thus, Larkin defines infrastructures as "built networks that facilitate the flow of goods, people, or ideas, and allow for their exchange over space" (Larkin 2013, 328). Scholars in STS generally agree that infrastructures are material things, but also the networks, relationships, and claims that give traction to those material systems (Anand 2017). However, as noted by Larkin, existing work on infrastructures tends "to privilege the technological" even if it defines them as "hybrid systems of humans and machines bundled together through infrastructural networks" (Larkin 2013, 339).

More recent insights in IR, often drawing upon STS literature, have examined how socio-material arrangements, which entangle human and non-human elements, embody, and perpetuate certain ways of knowing problems and governing them (Bueger 2018; Ruppert and Scheel 2019). Such insights have shown how such arrangements enact certain realities, but also produce actors, objects, and power relationships (Law 2004; Bueger 2015; Leander and Wæver 2018; Ruppert and Scheel 2019). The analytical frame of "knowledge infrastructures" refers more specifically to the socio-material ensembles that underpin and shape the production of knowledge (Hirsch and Ribes 2021). For Edwards, knowledge infrastructures are the "robust networks of people, artifacts, and institutions that generate, share, and maintain specific knowledge about the human and natural worlds" (Edwards 2010, 17). Such insights go beyond the study of immediate processes of knowledge creation and pay attention, instead, to the infrastructures that generate, organize, and shape the production of knowledge. Although the concept of knowledge infrastructure has been developed in relation to the production of scientific activity in academic fields and networks, it has more

recently been mobilized to study the production of knowledge in the expert and governmental spheres of global governance (Bueger 2015; Tichenor et al. 2022; Littoz-Monnet and Uribe 2023). Tichenor et al. (2022), for instance, define infrastructures as the background structures—the materials, people, and ideas—that enable the production of certain knowledge forms, such as quantification. While adopting this lens, scholars have been able to go beyond the micro-processes of producing artifacts, such as numbers, documents, or forecasts, and pay attention to the broader system(s) within which certain forms of knowledge are produced (Bueger 2015; Langevin 2019; Bandola-Gill 2023).

While the approach I take here builds upon these recent insights on the role of knowledge infrastructures, it lays the emphasis, first, on their "political economic" component, in a way that accounts for the politics, hierarchies, and power relationships that enable and permeate them. Scholars in the field of political economy have acknowledged that infrastructures are "inscribed with power. . . from their beginnings" (de Goede 2020, 352). Thus, de Goede shows that the global finance infrastructure "was historically built through colonial violence and political struggle" (2020, 353). Langevin also emphasizes that it is essential to consider dimensions of power within infrastructures, in order to capture "the kinds of social relations that infrastructure bundles together" (Langevin 2019). In addition, infrastructures have also been described as "sedimendations" of routine practices and technologies "that are difficult, if not practically impossible, to shift or overturn" (Hirsch and Ribes 2021, 3). Infrastructures of knowledge production thus "contain or embody certain political ambitions and rationalities" (de Goede 2020, 355) and are self-perpetuating, as they place limits on the knowledge and imaginaries that can be produced through them. Taking inspiration from such calls to re-integrate the role of asymmetries and resources into the study of materiality, I examine the political economy of socio-material arrangements and the way they are embedded in certain forms of orderings. Second, I also lay the emphasis on the mutually reinforcing relationship between the "structures" and the material artifacts produced within and through them, or the relationship of entanglement between the "machine" and its "parts". Doing so emphasizes how the "macro" and the "micro" are highly intertwined in processes of knowledge production.

Knowledge Machineries and Objects of Expertise

I mobilize, here, the concept of "knowledge machinery," for, like all machineries, it refers as much to a "structure," as to the (material) parts that make it work (Knorr Cetina 1999, 2007). The structuring "whole" and its parts enable and sustain one another. Additionally, the concept also denotes a shift away from works on "infrastructures," which often take as a starting point material systems and devices, such as cables, pipes, digital platforms, or yet payment infrastructures. Knorr Cetina has defined knowledge machineries as "entire conjunctions of conventions and devices that are organized, dynamic, thought about (at least partially), but not governed by single actors" (Knorr Cetina 1999, 11). Such machineries include ideational and material elements that are deeply enmeshed and intersected. The concept, initially used to describe the production of scientific activity in academia, is particularly well suited to studying "objects of expertise" (Esguerra 2024, this forum) in global governance. A machinery of knowing is a system of knowledge generation and validation; it refers to the "macro-epistemics," which "run on knowledge and expertise" (Knorr Cetina 1999, 8; Knorr-Cetina 2007). Such macro-epistemics might refer to ideational constructs and conventions; material infrastructures, policies of knowing, relationships, and political economic processes, which organize, shape, and validate the production of knowledge (see also Langevin 2019). Scholars have discussed, for instance, how dominant ways of thinking and their associated conventions constrain the way problems are apprehended in specific domains (Sending 2015; Schmidt-Wellenburg and Lebaron 2018). A machinery also includes networks and relationships. It has its experts, regulators, scientists, or governors, who make decisions about what numbers to collect, how to organize a database, or which report to produce. Despite an apparent multiplicity of actors and sites in global policy-making, the production of knowledge remains exclusive and self-referential (Littoz-Monnet 2022), so that certain sites, actors, or networks, endowed with prestige and resources, sit at its core, while others are peripheral. Such relationships have their political economy and logics of ordering. A knowledge machinery also includes technologies, which enable and shape the production of new knowledge. Such technologies are the computer systems, digital platforms, or apps through which knowledge is collected, assembled, produced, and made sense of. Knowledge machineries embed social norms, relationships, and ways of thinking, acting, and working (Star 1999).

Knowledge machineries produce specific "objects of expertise," which are embedded in the politics of the machinery but also sustain and enable it. It is through these objects that the problems of global governance are seen and made sense of. Objects of expertise consist of "authoritative knowledge relevant for governing put into a socio-material form" (Esguerra 2024, this forum). They are the statistics, codebooks, evaluations, policy reports, metrics, or data, used by international bureaucrats and experts to apprehend and govern problems. What distinguishes them from "knowledge" in a discursive form, whether one thinks of "paradigms," "ideas," or "theories," is their materiality. In addition, objects of expertise are special kinds of socio-material objects; they are endowed with authority and are seen as valuable and relevant in governmental spheres. They are part of the everyday and mundane knowledge apparatus through which the problems of global governance are understood and governed.

"Objects of expertise" produce their own effects. As "big data" are increasingly used to monitor, know, and govern populations', scholars have studied how they are producing problematization effects (Madsen et al. 2016, 279; Ruppert et al. 2017; Bellanova et al. 2021). In global health, the metrics of the "digital regime" problematize health as a global problem, with the global population as the "right" unit of intervention (Aue 2021). "Knowledge things" can circulate, be used, and evolve in ways that are non-linear and unpredictable. They can also be contested and put in dialogue or competition with alternative knowledge forms. But although the emphasis is often put on the unpredictable and ephemeral lives of material objects, objects of expertise also embody a logic, and a form of ordering. It is, first, only in relation to a broader machinery of knowledge that they take their meaning(s). "Numbers" become relevant indicators and metrics, rather than random exercises of adding, comparing, calculating, or simplifying only when named and valued as such. Such meanings tend to be delineated and stabilized within and through broader machineries of knowing. Second, objects of expertise become authoritative and

performative only within and through a knowledge machinery, which renders possible and validates certain forms of knowledge and dismisses others. The politics of objects of expertise need, thus, to be understood in relationship to the broader discursive constructs, material infrastructures, and power dynamics that "surround" and permeate their production .

The Knowledge Machinery of Global Health: Enabling mHealth Data and Its Devices

The knowledge machinery of global health is increasingly characterized by the dominance of market logics, the routinely involvement of private actors and sites, and the sedimentation of digital infrastructures of data assembling and analysis. Corporate actors, large consultancies, and philanthropic foundations have become widely involved in the governance of health problems, as funders, policy partners, and experts, but also as producers of the digital data that are used by IOs (McCoy, Chand, and Sridhar 2009; Reubi 2018; Aue 2021; Littoz-Monnet and Osorio Garate 2023; Eckl and Hanrieder 2023).

This turn has occurred throughout the 2000s, as the WHO, often echoing arguments developed by the World Bank and the World Economic Forum (WEF), has developed a discourse approaching health through an economistic rationale, where health problems are approached through market logics and corporate accounting techniques. The "health is wealth" narrative fashions all health problems in terms of income and productivity losses, as measured by the so-called Global Burden of Disease (GBD). Formulated a decade earlier by the World Bank, the narrative makes the case that the loss of healthy life caused by "disability" (defined as including all pathologies), or premature death, is an impediment to economic productivity (World Bank 1993, 17–21). This discourse was adopted by the WHO with the creation of its Commission on Macroeconomics and Health, led by economist Jeffrey Sachs and staffed with Ivy League educated econometric experts from the World Bank, the International Monetary Fund (IMF), the banking sector, and private companies, which defined health as one of the "cornerstones of human capital" (WHO 2001, 21). At the same time, the digitalization of health has been portrayed as the way to "improve the efficiency and cost-effectiveness of care, allowing for new business models in the delivery of services" (WHO 2021, 10). The knowledge machinery of global health sustains an economistic discourse, where health risks and pathologies, but also the "effectiveness" of specific interventions', must all be quantifiable and measurable (Rushton and Williams 2012; Sparke 2020).

As market logics were spreading out in governmental spheres, and to address budgetary constraints, the WHO has fashioned partnerships with private actors as "a vital necessity" (WHO 2008, 24) and valuing private companies for their "business and scientific expertise, focusing on strong results-based operations" (Collins, Mikkelsen, and Axelrod 2019). In the hope of attracting private donors, the WHO has produced cost-benefit calculations showcasing some interventions worth "investing" in, in order to gather the best possible "returns." Thus, Bloomberg Philanthropies, as well as the Gates Foundation, have largely invested in the production of health metrics (Mahajan 2019). Private companies have also invested in the WHO's programs, in particular those focused on the development of digital health (WHO 2021).

This machinery of knowing has produced and enabled mHealth and its logics. In 2012, the WHO and the ITU have launched "Be He@lthy, Be Mobile" as a joint initiative to encourage and enable the use of mHealth technologies in member states, assist health staff in storing and accessing medical records, monitor that patients follow their treatments, and diffuse the WHO's health recommendations on disease prevention (WHO and ITU 2019b). As part of the Be He@lthy, Be Mobile initiative, the WHO and the ITU have been developing stylishly labeled programs, mCervicalCancer, mHypertension, mDiabetes, mBreatheFreely (for asthma and respiratory diseases), mTBTobacco (for tuberculosis and tobacco), and the soon to be ready mSmartLife. The WHO/ITU see mHealth as a cost-effective solution to healthcare, adding that "[f]or the private sector, there is a clear *investment* case: new delivery models, new digital services, and savings from disease prevention" (WHO and ITU 2019b, 6, emphasis added). The logic at the heart of this discourse has attracted investments by telecommunication and pharmaceutical companies, which partner with the WHO for the design and launch of the mHealth programs launched as part of its 2012 Be He@lthy, Be Mobile initiative.[3] Novartis, GlaxoSmithKline, Sanofi, the International Federation of Pharmaceutical Manufacturers and Associations, and Verizon, all joined in to encourage the development of digital technologies such as mobile text messaging and mobile apps (Sanofi 2016). In 2014, Sanofi has become the WHO's sole partner for the mDiabetes program, supporting the development and implementation of the program by providing expertise in diabetes prevention and management (WHO and ITU 2018). With Sanofi onboard, mDiabetes will involve "reminders to patients on topics such as their blood glucose levels and food intake," so that the initiative can be more "clinically ambitious" with the data generated.[4] The WHO has also partnered with the telecommunication company Rakuten Viber to create a new interactive chatbot designed to inform people about COVID-19 because this partnership would give it the "potential to reach over 1 billion people in their local language directly through their mobile phones."[5] The push toward mHealth, and the use of mobile phone data for monitoring purposes, has also been sustained by private philanthropists, who routinely partner with the WHO in such efforts and fund research studying the advantages of mHealth (Hyder et al. 2017). Bloomberg Philanthropies has in particular partnered with the WHO in the implementation of its approach to surveillance (WHO 2023). In the context of this partnership, it has been pushing for the use of mobile phones to collect data at a cheaper cost (Littoz-Monnet and Osorio Garate 2023). The support of pharmaceutical and telecommunication companies, and of donors, is seen as "enabling" the work of the WHO. This is flagged out by the WHO, which makes it clear that it is "actively looking for private, academic, government, and NGO partners who share its vision of scaling mHealth services across the globe," and prioritizes "partners who are genuinely com-

[3] "Delivering digital solutions to improve well-being and catalyze development." International Telecommunication Union, accessed November 6, 2023, https://www.itu.int/en/ITU-D/ICT-Applications.

[4] "Sanofi joins WHO-backed diabetes mHealth programme." PMLiVE, accessed November 11, 2023, https://www.pmlive.com/blogs/digital_intelligence/archive/2015/february/sanofi_joins_who-backed_diabetes_mhealth_programme_664300.

[5] "WHO and Rakuten Viber fight COVID-19 misinformation with interactive chatbot." World Health Organization, accessed November 6, 2023, https://www.who.int/news-room/feature-stories/detail/who-and-rakuten-viber-fight-covid-19-misinformation-with-interactive-chatbot.

mitted to public-private partnerships."[6] The WHO and the ITU offer private partners multiple options to get involved: sponsoring product development, licensing content for the initiative, disseminating WHO-validated digital health program content, or yet providing "in-kind support," "including technology solutions, staff time, marketing resources, messaging content (subject to vetting processes), knowledge or expertise" (WHO 2023). These calls have been successful. Private actors have widely invested in the mHealth programs launched by the WHO and the ITU. They have also directly designed and produced a large share of the material technologies of mHealth, the apps, text messages, and chatbots that diffuse health recommendations and produce data.

The privatization of the knowledge machinery of global health has largely been entangled with the digitalization of its material infrastructure (Star and Ruhleder 1996). As processes of agenda-setting and prioritization increasingly rely on big data, algorithms, and digital techniques of data interpretation, private companies and philanthropists' data have become increasingly sought after, as they have the resources to produce such data and technologies (Reubi 2018; Littoz-Monnet and Osorio Garate 2023). In turn, private investments have sustained and activated the development of digital techniques of data collection and assembling, as evidenced by the emergence of mHealth. The knowledge machinery of global health has a distinct technological infrastructure made up of computer systems (doing the data aggregation and analysis), digital platforms, projection tables, and mHealth devices. This infrastructure enables the production of "big data," where highly disparate forms of data emanate from "everywhere" (Aradau and Blanke 2017; Flyverbom, Madsen, and Rasche 2017) and guide policymaking and circulate in novel ways (Elbe 2021). This knowledge machinery has produced new "objects of expertise" (Esguerra 2024, this forum). mHealth devices have spread out in global health, as promising tools to improve "health delivery," disease prevention, monitoring, and surveillance (WHO and ITU 2022a), but also as ways of *creating new digital data*. With its logics, sites, and material infrastructures, this increasingly privitized and digitized knowledge machinery materially and ideationally enables the production of mHealth data as a novel object of expertise, and also constructs such data as solutions in themselves. Objects of expertise embody the logics and politics of the machinery of knowing they are part and parcel of, and also enable it.

"Self-Bettering," Curing, and Surveilling through the Phone

Private companies, but also IOs, increasingly use mHealth data to know and govern health throughout the globe. mHealth data have specific characteristics and hold certain promises; yet, "observing" and "following" the data alone does not fully capture the politics embedded into it. Data are generated within and through specific socio-technical structures that enact a certain vision of the world, and of what needs to be counted and predicted (Monsees and Wæver 2019). mHealth data are embedded in, sustain, and enable the logic of the machinery of knowledge of global health. They also produce their own politics, but these, I argue, tend to reinforce, rather than disrupt, the logic of the machinery they are embedded in.

The Politics of Turning Bodies, Moves, and Moods into Data Units

mHealth data are, first, a materialization, but also a *turning of lifestyles, pathologies, and even moods into data*. As people are engaging with the technologies of mHealth to monitor their daily food intake, measure their glucose levels, or manage their stress, they are capturing information concerning their health conditions, daily behavior, and states of being. While they are doing so, they are turning their bodily conditions and experiences into something that can be measured and counted. Thus, as people are encouraged, via text messages or other technological devices, to follow their treatments and improve their lifestyles, they also enable the incessant datafication of an increasing number of aspects of our lives. Scholars have well captured the way in which such technologies prompt users to explore their datafied self, as a "data double" (Haggerty and Ericson 2000; Ruckenstein 2014). In this vision, human bodies and minds become abstractions, "data flows that can be used and reflected upon" (Ruckenstein 2014, 71), thus facilitating new modes of knowing the body and disease (Mol 2002). The fabric of such data is rendered possible by digitalization, but it is also reflecting a paradigm where datafication is a way of approaching reality—the belief that all aspects of life can be quantified and turned into data units. Via the technological artifacts of mHealth, individuals are encouraged to monitor their own bodily "data," and act upon it until it matches the "normal" biomedical measurements of the fit, healthy, and responsible behavior expected (WHO and ITU 2022b). The creation of such data in turn facilitates modes of knowing where the "burden" or "cost" of health pathologies throughout the globe can be measured and showcased, so that health interventions can also be framed as "investments" to address such costs.

Second, mHealth data are *incessantly in the making*. When people are encouraged to watch and improve their lifestyles, or follow their treatments, they are also invited and induced to create "data" about their bodies. Thus, mHealth data are not simply "collected," they are continuously *created* and captured. Thus, the WHO/ITU's Be He@lthy, Be Mobile initiative puts "users" at the core of its strategy, for their engagement is a precondition for the generation of entirely new data concerning their own health practices and conditions, whether it is their daily food intake, blood sugar levels, patterns of sleep, and so on.[7] The initiative evokes the necessity of influencing users' engagement with the "product" (WHO and ITU 2019b, 6). The continuous creation of mHealth data therefore relies on the participation of the "digital user," who engages in "self-betterment" (Ruckenstein 2014, 69). In this vision, the "digitally engaged patient" (Lupton 2013; Lupton 2014) involved in "self-management of care and person-centred care," to cite the words of the WHO itself, is seen as instrumental to global health delivery (WHO 2021, 8). But watching one's own daily food intake, blood sugar levels, patterns of sleep, and so on is in itself not sufficient; people need to do this while interacting with mHealth devices, for such observations to become data. This logic has its own politics; first, it is embedded in a knowledge machinery where *technologies* of data generation and accumulation are seen as essential to addressing health problems. The continuous nature of data generation also feeds into claims of data capacity, where the sheer quantity of data generated is invoked to further legitimize the use of mobile phones as a new data gathering device (Hyder et al. 2017, 2). Second, it sustains a vision of health as an

[6] "Be He@lthy, Be Mobile." World Health Organization, accessed November 6, 2023, https://www.who.int/initiatives/behealthy.

[7] "Be He@lthy, Be Mobile." World Health Organization, accessed November 6, 2023, https://www.who.int/initiatives/behealthy.

individual problem. By placing the responsible digital user at the core of its success, it is fashioning people as answerable for their own health. Citizens, rather than health authorities, are seen as capable of addressing their pathologies and controlling their "bad" habits. This vision, thus, champions individualized health practices over other forms of interventions, thus leaving aside environmental and social health determinants (Ayo 2012). As such, it clearly "aligns with the neoliberal health perspectives" and its focus on the responsible individual (Rich and Miah 2017, 87), thus sustaining and further enabling such logics into health governance through the unfolding of mHealth technologies and their data.

Mhealth data are also seen and designed to be fully *mobile and interchangeable* across settings. Bodies, turned into data, are converted into units that feed into a broader digital data assemblage (WHO and ITU 2020). The WHO/ITU indeed explain, in their Digital Health Platform Handbook, that mHealth data must be "standardized" and "consistent" (WHO and ITU 2020, 8). The strategy consists in producing mHealth devices capable of generating fully mobile and interoperable data, meant to become part of a digital system of data circulation and exchange across devices and health settings. The full standardization of mHealth data is, in this vision, a precondition to its "seamless" exchange (WHO and ITU 2020). The development of mHealth data is, indeed, seen as prefiguring the development of a perfectly "interoperable digital health ecosystem," a kind of digital infrastructure used by the health community "across all care settings" (WHO 2021). This ecosystem promises to enable "the seamless and secure exchange of health data by and between users, health care providers, health systems managers, and health data services" (WHO 2021, 12). This narrative, held by the WHO/ITU, as well as their private partners, is critical of the way a tremendous volume of digitized information is produced, yet remains isolated and siloed, preventing it to "support informed decision-making at all levels".[8] The exchange and sharing of full mobile data across the "health eco-system" is, indeed, fashioned as the all-round solution to better health delivery and "evidence-based knowledge" (WHO 2021, 8). mHealth data are, thus, conceived of data streams feeding into big data analytics, seen itself as the solution to more effective decision-making and also "affordable" health care. As such data circulate, they turn people into units in a wider data assemblage where, ultimately, all digital data should circulate and become accessible from anywhere within the "eco-system" (Williamson 2014). This narrative is strongly embedded into a logic where health is seen as quantifiable, but also commensurable across settings and decontextualized. As mHealth data are easily removed from their original place of discovery or generation, they become disembedded and feed into large dataflows used for prioritizing global health interventions (Leonelli 2016).

The knowledge machinery of global health, characterized by the spreading out of digitalization and its techniques of data generation and transformation, the embedding of market logics, and the ubiquity of private donors and for-profit companies in governmental spheres, as partners but also as knowledge providers and designers of technologies, has rendered possible the emergence of mHealth and its data as a way of governing public health. mHealth data have distinct properties and claim attached to them: They are a continuous turning of bodies and moods into standardized and mobile data units. mHealth data, as objects of expertise that render health knowable, are embedded into a vision of health as entirely measurable and quantifiable, where pathologies and even moods can be turned into numbers that feed into data flows. They are also relying on a conception of health as an individual problem, where the digital user is in control of their body and lifestyle, a logic which fits well in line with neoliberalism and market logics. Last, the production of mHealth data are also embedded into a vision of technologies as the solution to better and more "cost-effective" healthcare. The knowledge machinery of global health and its digital infrastructures materially enable the creation of such data through mobile phones, but it also ideationally constructs such data and technologies as necessary, desirable, and the solution to all. mHealth data are objects of expertise that reflect the logics of the global health knowledge machinery, but also produce ordering, norming, and governance effects.

The Ordering, Norming, and Governance Effects of mHealth Data

As mHealth data are conceived as—highly mobile—units within a larger data ecosystem, they enable and produce, first, *new forms of relationships between "digital users," health centers, and program designers.* The technologies of mHealth and the data created through its devices make it possible to quasi-instantly navigate between individuals' personal lives, health staff, and health governors, connecting these different sites in an entirely novel fashion. On the one hand, the technological artifacts of mHealth step into individuals' private lives, as if people had "a physician in their pocket" (Lupton and Jutel 2015). As people engage with "self-tracking," they interact with their mobile apps and start getting "in control" of their bodies. As put by the WHO, the digital ecosystem is "person-centric" (WHO 2021, 12). At the same time, however, people produce data that are assembled and aggregated, producing new possibilities for healthcare centers and health authorities to observe whether people take their medicines, exercise, eat "properly", and thus monitor their health interventions. As bodily conditions are turned into highly mobile data, these data indeed link individuals to healthcare centers and healthcare authorities, creating new possibilities for surveillance and program monitoring. As such, mHealth data creates new ways for policymakers to observe and know "global health" (Ruckenstein 2014). mHealth data have, indeed, been embraced by the WHO, the ITU, as well as their corporate partners, for opening up the possibility to relentlessly monitor that people actually follow the recommendations set by global health governors. The WHO/ITU's mHealth programs emphasize the rapid availability of mHealth data, which are associated with the hope of a more effective monitoring of health risks throughout the globe and a better evaluation of program impact on behavior change, disease awareness, and outcomes (WHO and ITU 2017). mHealth data are seen as permitting more "frequent surveillance of population health, one that will permit more *timely* evaluation of implemented public health policies and response to public health emergencies" (Ellis 2017). In the mTB-Tobacco program for instance, the WHO states that mHealth data "can provide ongoing real-time data for the administration and operation of the programme, and data can also be collated and analysed for monitoring" (WHO and ITU 2019a). In this new form of politics, individuals are seemingly in charge of their health; yet, program designers and their commercial partners, who aggregate and own mHealth data, in fact become empowered. As a result of their oversight of these processes, they can claim to be in possession of

[8]"Be He@lthy, Be Mobile." World Health Organization, aceessed November 6, 2023, http://www.who.int/initiatives/behealthy

profuse, accurate, and even quasi-instant knowledge of reality, thus gaining further epistemic legitimacy as knowers of health problems worldwide. The way mHealth creates a relationship between bodies, technologies, and program designers cannot, thus, be studied without looking at "the sociocultural constructs that also affect bodies materially" (Fox 2016, 67).

As mHealth data unfold the possibility for health staff to follow patients who are being prescribed a treatment, but also for health program designers to relentlessly monitor that people follow the recommendations set, it also *produces normed bodies and lifestyles throughout the globe*. As the devices of mHealth are embedded in a vision where good health is equated to "having the right numbers," whether it is for hypertension levels or daily calories intake, "good health" becomes synonymous with the reaching of such numbers. mHealth devices indeed embody a set of assumptions about what "normal" biomedical markers are, and induce people to check whether their blood pressure, pulse, cholesterol, or menstruation pattern match these. They also sustain specific ideas about what a healthy lifestyle or a satisfying mood consists of, as well as how bodily conditions seen as not "fitting" should be handled (WHO and ITU 2022b). mHealth devices and the data they generate thus help producing streamlined individuals across the globe. While asking digital users to observe their bodies and moods, health governors also ask them to *adjust* their health and lifestyles, until they match the ideal measurements of the active, healthy, and responsible individual. The WHO and the ITU hope that "the use of modalities such as text messages, applications, and chatbots can influence behavioural change and positively impact health and well-being" (WHO and ITU 2022a, 10). To that effect, the Be He@lthy, Be Mobile initiative relies on the creation of "personas," fictional archetypes of the users of a "product" (WHO and ITU 2019b, 6). While doing so, the WHO and the ITU attempt to identify which factors may influence the engagement of different kinds of users (WHO and ITU 2019b, 6), so that they adhere to the norms promoted by IOs and their private partners to achieve "self-betterment" (Ruckenstein 2014, 69). In its efforts to shape individuals' lifestyles, the WHO also increasingly partners with private companies. It has, for instance, partnered with Google Fit to develop Heart Points, an app that measures activity and awards one point for "each minute of moderately intense activity" and double points for "more intense activities such as running," with the objective of having people do the amount of physical activity recommended by the WHO.[9] This raises a number of questionings, given that when Google bought Fitbit, a fitness tracking company, many thought that "The most obvious potential lure is the health data of millions of Fitbit customers," given that "Fitbit devices have been tracking wearers' health metrics for over a decade, cataloging behaviors like steps taken, calories burned and exercises performed."[10] As health governors turn into sites of data accumulation, they also become endowed with the authority to produce standardized health recommendations, applicable everywhere. As mHealth is embedded in a vision of health as quantifiable, where bodies can be turned into data, it produces, in turn, individuals who both produce numbers themselves and are normed by the "ideal" numbers they are trying to reach. The streamlining of individuals through these numbers is, however, not without its own intricacies. Such norms and their "ideal numbers" are not necessarily applicable to all contexts and individuals. As such, they may also produce undue anxieties, where individuals become worried when they do not match the norms set, when they exercise the "right" amount or become categorized as having a "pre-hypertension" diagnosis. This is all the more concerning that there are also debates in the medical field itself about such norms, whether it is about the "right" thresholds for hypertension, what makes for a healthy diet, a good sleep pattern, and so on (Alderman 2000).

Finally, the generation of mHealth data has become, as such, a way of governing health, which is sustaining *data as a way of governing in itself*. In contrast to what is now seen as sparse and unhelpful statistical data, the technologies of mHealth unfold the possibility of the continuous generation of new knowledge (Ruckenstein 2014). The unremitting nature of data generation via mHealth devices feeds into a discourse where data capacity is becoming an end in itself (Hyder et al. 2017). In its Global Strategy on Health 2020–2025, the WHO states that the "strategic and innovative use of digital and cutting-edge information and communications technologies will be an essential enabling factor towards ensuring that 1 billion more people benefit from universal health coverage, that 1 billion more people are better protected from health emergencies, and that 1 billion more people enjoy better health and well-being" (WHO 2021, 8). With the emergence of mHealth, and digital health more broadly, having more and better data is increasingly perceived as a solution to problems. This produces, thus, a mode of governing as a continuous "response" to data, where the profuse, continuous, and quasi-instant qualities of mHealth data further justify the data-based governance narrative. mHealth and its data stack also sustain a vision of governance as a rational, apolitical, and technological exercise, a simple adjustment to data, endowed with quasi-magic qualities (Krasmann 2020). This also produces a vision of health problems as identifiable in a kind of snapshot fashion, at a given moment, and solved as they are being identified, rather than in the long run. In this way of governing, long-term and more structural reforms risk being left aside.

As the continuous generation and capturing of data relies on technological devices, the involvement of technology designers and producers, and private investments, is also seen as "critical" (WHO 2021, 7), thus further legitimizing their involvment in the machinery of global health. Additionally, the profuse data stack created through the devices of mHealth may be entirely repurposed and serve unpredictable usage and ends (Lupton 2014). mHealth has, indeed, become a huge market, where data assembled for public health surveillance may also be used for commercial uses.[11] At a time when knowledge is increasingly becoming a commodity (Rikap 2021), the existence of such data raises a number of ethical issues, related to confidentiality or the way it could possibly be used (DiStefano and Schmidt 2016). Thus, while the WHO wants mobile phone data to support public health (WHO 2017, 29), the intentions of private companies and donors are less clear (Ali, Dolui, and Antonelli 2017). For-profit companies may, for instance, engage in public health surveillance as a possible means of collecting data on the consumption of alcohol, tobacco, and sugar-sweetened beverages that may also serve commercial

[9] "Google Fit: Coaching you to a healthier and more active life." Google Fit, accessed November 14, 2023, https://www.google.com/fit/.

[10] Patrick Lucas Austin, "The Real Reason Google is buying Fitbit," *The Time*, https://time.com/5717726/google-fitbit.

[11] "mHealth Market Size to Reach USD 361.67 Billion in 2027." Biospace, accessed November 6, 2023, https://www.biospace.com/mhealth-market-size-to-reach-a-valuation-of-usd-361-67-billion-by-2027-industry-trends-rapid-digitalization-in-the-healthcare-sector.

uses. Data mining companies may also gather such data and process them to create profiles of people with specific pathologies and sell these to private companies (Pasquale 2014). The recent WHO–Google Fit partnership, to develop Heart Points, for instance, raises a number of questions, as Fitbit is working together with insurance companies, as well as corporate partners, to disseminate the use of fitness trackers, thus creating confusion concerning practices of data ownership (Austin 2019). In fact, the WHO itself is also "joining forces with the health insurance industry." In July 2018, Be He@lthy, Be Mobile hosted a dialogue with the insurance industry, where participants discussed "digital tools, emerging markets, user data, behaviour change, financing and divestment from harmful industries" (WHO and ITU 2018, 39). As mHealth necessitates such partnerships to operate, new forms of entanglements between IOs and corporate partners arise, which sustain and even reinforce the privatization of the knowledge machinery of global health.

mHealth and its data produce effects, which overall sustain the logics of the machinery within which they are embedded. mHealth data construct, first, new kinds of relationships between individuals, health centers, and health governors, where data connect formerly separated sites. While mHealth is fashioned as a way of empowering individuals and inducing them to take charge of their health, it in fact creates a form of ordering that empowers program designers and their partners. Not only do health governors now have at their disposal novel devices to "reach individuals' private lives", but they can also accumulate a data stack, which can be used to make visible certain problems, legitimize their agendas, and assert their own epistemic legitimacy. Second, mHealth and its data produce normalized individuals, as people are trying to reach the standardized biomedical markers and lifestyle recommendations set by health governors, regardless of contexts and individual specificities. This reinforces the logics of the machinery, where health problems are quantifiable, measurable and decontextualized. Third, it also sustains a way of governing, where data are seen as increasingly essential, and the possession of data becomes itself the solution to problems. Not only does this sustain a narrative where the continuous generation and sharing of data is necessary, but it also fashions *technologies* as the solution to better, cheaper, and more "cost-effective" healthcare. Mobile phones are, it is worth mentioning, unproblematically fashioned as neutral technologies with the potential to deliver more effective healthcare. Thus, the fact that the use of mobile phones has, itself, been debated as a health risk is, ironically, never considered. In this highly technological vision of health governance, the biases and effects of technologies themselves are ignored. Additionally, this technological vision further sediments the presence of private companies, as designers of health apps and providers of technological devices without which mHealth cannot operate. As the production of technologies of data production is owned by a few (Rikap 2023), this way of governing risks reinforcing asymmetries.

Conclusion

At a time when digital data are captured, transformed, and interpreted in multiple sites and through often impenetrable techniques, the foundations of the knowledge used to govern global problems increasingly seem incomprehensible and out of reach for the general public, but also regulators, experts, analysts, and scholars. As put by Ulrich Beck, in the "risk society," the responsibility for the effects of technologies is increasingly dispersed and difficult to attribute to individuals, but also to organizations, and systems (Ulrich 1992). Yet, for that reason, we need *more* research on the where, how, and by whom of knowledge production. Even the messy and somewhat chaotic processes of knowledge making that we observe have their own political economy, relationships, and forms of ordering. Exploring these is also an intervention; it opens new possibilities for questioning the existing status quo and, to some degree, attribute responsibilities for the effects of technologies and the data produced through them.

Mobilizing the concept of "knowledge machinery" is a first step to reintroduce a sense of "attribution," not necessarily to "actors"—although this should not be a priori dismissed, but to certain socio-material "systems" and the way they organize the production of knowledge, produce certain objects of expertise, and delineate imaginaries of the possible. Knowledge machineries are political; they are embedded in certain logics, but also in specific power relations and asymmetries, whether it is about resource distribution, norms of scientific validity, or status, and they also sustain these. In the knowledge machinery of global health, the spreading out of market logics does not only shape modes of thinking and acting upon problems; it also empowers, and even makes it necessary, that private companies or donors produce data and technologies of data assembling themselves. Global machineries of knowing have a changing spatiality and materiality, as private knowledge sites increasingly sit at the core of dispersed and digitally enabled data and knowledge-making processes.

Examining knowledge machineries, the socio-material machineries that organize the production of knowledge, makes it possible to locate technological devices, objects of expertise, or knowledge artifacts of any kind, within the broader wholes they are part and parcel of. Existing research has very well captured that technological devices are deeply embedded in visions and theories of social reality (Monsees and Wæver 2019; de Goede 2020), challenging the idea that prevails in IR scholarship of technology, science, and knowledge as mere tools. I argue that capturing the politics of knowledge artifacts also necessitates reasserting how "macro-epistemics," such as policies thatv delineate the validating of evidence, beliefs that relate to knowledge issues, webs of infrastructures, and so on, "run on knowledge and expertise" (Knorr Cetina 1999, 8) and are highly intertwined with more immediate practices of knowledge production. Material artifacts, whether data, numbers, or calculations, are constrained by the machinery, but at the same time, they sustain the "whole" and give it traction.

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References

Alderman, Michael H. 2000. "Debate: Does It Matter How You Lower Blood Pressure?" *Current Controlled Trials in Cardiovascular Medicine* 1 (2): 69–71.

Ali, Muhammad Salek, Koustabh Dolui, and Fabio Antonelli. 2017. "IoT Data Privacy via Blockchains and IPFS." In *IoT '17: Proceedings of the Seventh*

International Conference on the Internet of Things. 1–7, New York, NY: Association for Computing Machinery.

Anand, Nikhil. 2017. *Hydraulic City: Water and the Infrastructures of Citizenship in Mumbai*. Durham, NC: Duke University Press.

Aradau, Claudia, and Tobias Blanke. 2017. "Politics of Prediction: Security and the Time/Space of Governmentality in the Age of Big Data." *European Journal of Social Theory* 20 (3): 373–91.

Aue, Luis. 2021. "How Do Metrics Shape Polities? From Analogue to Digital Measurement Regimes in International Health Politics." *International Political Sociology* 15 (1): 83–101.

Austin, Patrick Lucas. 2019. "The Real Reason Google is Buying Fitbit." *Time*. Accessed November 4, 2019. https://time.com/5717726/google-fitbit/.

Ayo, Nike. 2012. "Understanding Health Promotion in a Neoliberal Climate and the Making of Health Conscious Citizens." *Critical Public Health* 22 (1): 99–105.

Bandola-Gill, Justyna. 2023. "Our Common Metrics? Our Common Agenda Report and the Epistemic Infrastructure of the Sustainable Development Goals." *Global Policy* 14 (S2): 8–12.

Bellanova, Rocco, Kristina Irion, Lindskov Jacobsen, Ragazzi Katja, Saugmann, Rune Francesco, and Lucy Suchman. 2021. "Toward a Critique of Algorithmic Violence." *International Political Sociology* 15 (1): 121–50.

Bueger, Christian. 2015. "Making Things Known: Epistemic Practices, the United Nations, and the Translation of Piracy." *International Political Sociology* 9 (1): 1–18.

———. 2018. "Territory, Authority, Expertise: Global Governance and the Counter-Piracy Assemblage." *European Journal of International Relations* 24 (3): 614–37.

Buerger, Christian, and Jan Stockbruegger. 2024. "Ocean, Objects, Infrastructures: Making Modern Piracy." *Global Studies Quarterly*, 4 (3), Special Forum: "Objects of Expertise."

Collins, Téa, Bente Mikkelsen, and Svetlana Axelrod. 2019. "Interact, Engage or Partner? Working with the Private Sector for the Prevention and Control of Noncommunicable Diseases." *Cardiovascular Diagnosis and Therapy* 9 (2): 158–64.

DiStefano, Michael J., and Harald Schmidt. 2016. "mHealth for Tuberculosis Treatment Adherence: A Framework to Guide Ethical Planning, Implementation, and Evaluation." *Global Health: Science and Practice* 4 (2): 211–21.

Eckl, Julian, and Tine Hanrieder. 2023. "The Political Economy of Consulting Firms in Reform Processes: The Case of the World Health Organization." *Review of International Political Economy* 30 (6): 2309–2332.

Edwards, Paul N. 2010. *A Vast Machine: Computer Models, Climate Data, and the Politics of Global Warming*. Infrastructures. Cambridge, MA: MIT Press.

Elbe, Stefan. 2021. "Bioinformational Diplomacy: Global Health Emergencies, Data Sharing and Sequential Life." *European Journal of International Relations* 27 (3): 657–81.

Ellis, Jennifer A. 2017. "Leveraging Mobile Phones for Monitoring Risks for Noncommunicable Diseases in the Future." *Journal of Medical Internet Research* 19 (5): e137.

Esguerra, Alejandro. 2024. Objects of Expertise. The Socio-Material Politics of Expert Knowledge in Global Governance. *Global Studies Quarterly*, 4 (3), Special Forum: "Objects of Expertise."

Finiguerra, Anna. 2023. "A Boat's Afterlife: Multiple Translations of Migratory Debris." *European Journal of International Relations* 29 (3): 628–50.

Flyverbom, Mikkel, Anders Koed Madsen, and Andreas Rasche. 2017. "Big Data as Governmentality in International Development: Digital Traces, Algorithms, and Altered Visibilities." *The Information Society* 33 (1): 35–42.

Fox, Nick J. 2016. "Health Sociology from Post-Structuralism to the New Materialisms." *Health* 20 (1): 62–74.

Gieryn, Thomas F. 1999. *Cultural Boundaries of Science: Credibility on the Line*. Chicago, IL: University of Chicago Press. https://press.uchicago.edu/ucp/books/book/chicago/C/bo3642202.html.

Goede, Marieke de. 2018. "The Chain of Security." *Review of International Studies* 44 (1): 24–42.

———. 2020. "Finance/Security Infrastructures." *Review of International Political Economy* 28 (2): 351–68.

Gusterson, Hugh. 1997. "Studying up Revisited." *PoLAR: Political and Legal Anthropology Review* 20 (1): 114–19.

Haggerty, K.D., and R.V. Ericson. 2000. "The Surveillant Assemblage." *The British Journal of Sociology* 51 (4): 605–22.

Hirsch, Shana, and David Ribes. 2021. "Innovation and Legacy in Energy Knowledge Infrastructures." *Energy Research & Social Science* 80: 102218.

Hyder, Adnan A., Adaeze C. Wosu, Dustin G. Gibson, Alain B. Labrique, Joseph Ali, and George W. Pariyo. 2017. "Noncommunicable Disease Risk Factors and Mobile Phones: A Proposed Research Agenda." *Journal of Medical Internet Research* 19 (5): e133.

Knorr Cetina, Karin. 1999. *Epistemic Cultures: How the Sciences Make Knowledge*. Cambridge, MA: Harvard University Press.

———. 2001. "Objectual Practice." In *The Practice Turn in Contemporary Theory*, edited by K. Knorr Cetina, Theodore R. Schatzki and Eike von Savigny, 184–97. London: Routledge.

———. 2007. "Culture in Global Knowledge Societies: Knowledge Cultures and Epistemic Cultures." *Interdisciplinary Science Reviews* 32 (4): 361–75.

Krasmann, Susanne. 2020. "The Logic of the Surface: On the Epistemology of Algorithms in Times of Big Data." *Information, Communication & Society* 23 (14): 2096–109.

Langevin, Marie. 2019. "Big Data for (Not So) Small Loans: Technological Infrastructures and the Massification of Fringe Finance." *Review of International Political Economy* 26 (5): 790–814.

Larkin, Brian. 2013. "The Politics and Poetics of Infrastructure." *Annual Review of Anthropology* 42 (1): 327–43.

Latour, Bruno. 1987. *Science in Action: How to Follow Scientists and Engineers Through Society*. Cambridge, MA and London: Harvard University Press.

———. 1988. *The Pasteurization of France*. Translated by A. Sheridan and J. Law, Cambridge, MA and London: Harvard University Press.

Latour, Bruno, and Steve Woolgar. 1979. *Laboratory Life: The Social Construction of Scientific Facts*. Princeton, NJ: Princeton University Press. https://press.princeton.edu/books/paperback/9780691028323/laboratory-life.

Leander, Anna, and Ole Wæverx, eds. 2018. "Introduction: Assembling Exclusive Expertise: Knowledge, Ignorance and Conflict Resolution in the Global South." In *Assembling Exclusive Expertise: Knowledge, Ignorance and Conflict Resolution in the Global South. Worlding Beyond the West*. London & New York: Routledge.

Law, John. 2004. *After Method: Mess in Social Science Research*. London: Routledge.

Leander, Anna. 2013. "Technological Agency in the Co-Constitution of Legal Expertise and the US Drone Program." *Leiden Journal of International Law* 26 (4): 811–31.

———. 2024. "Objects at Work. Cybersecurity Certificates Making Topological Expertise." *Global Studies Quarterly*, 4 (3), Special Forum: "Objects of Expertise."

Leonelli, Sabina. 2016. *Data-Centric Biology: A Philosophical Study*. Chicago, IL: University of Chicago Press. https://press.uchicago.edu/ucp/books/book/chicago/D/bo24957334.html.

Littoz-Monnet, Annabelle. 2022. "Exclusivity and Circularity in the Production of Global Governance Expertise." *International Political Sociology*, 16 (2): 1–20

Littoz-Monnet, Annabelle,, and Ximena Osorio Garate. 2023. "Knowledge politics in Global Governance. Philanthropists' Knowledge-Making Practices in Global Governance." *Review of International Political Economy*, 31 (2): 755–780

Littoz-Monnet, Annabelle,, and Juanita Uribe 2023. "Methods Regimes in Global Governance. The Politics of Evidence-Making in Global Health." *International Political Sociology* 17 (2).

Lupton, Deborah. 2013. "The Digitally Engaged Patient: Self-Monitoring and Self-Care in the Digital Health Era." *Social Theory & Health* 11 (3): 256–70.

———. 2014. "Self-Tracking Modes: Reflexive Self-Monitoring and Data Practices." In *SSRN Scholarly Paper*. Rochester, NY: University of New South Wales (UNSW) - Faculty of Arts and Social Sciences.

Lupton, Deborah, and Annemarie Jutel. 2015. "'It's Like Having a Physician in Your Pocket!' A Critical Analysis of Self-Diagnosis Smartphone Apps." *Social Science & Medicine* 133: 128–35.

Madsen, Anders Koed, Mikkel Flyverbom, Martin Hilbert, and Evelyn Ruppert. 2016. "Big Data: Issues for an International Political Sociology of Data Practices 1." *International Political Sociology* 10 (3): 275–96.

Mahajan, Manjari. 2019. "The IHME in the Shifting Landscape of Global Health Metrics." *Global Policy* 10 (S1): 110–20.

McCoy, David, Sudeep Chand, and Devi Sridhar. 2009. "Global Health Funding: How Much, Where It Comes from and Where It Goes." *Health Policy and Planning* 24 (6): 407–17.

Mol, Annemarie. 2002. *The Body Multiple: Ontology in Medical Practice. Science and Cultural Theory*. Durham, NC: Duke University Press.

Monsees, Linda, and Ole Wæver. 2019. "Theory is Technology—Ole Wæver in Conversation with Linda Monsees." In *Technologies of International Relations*, edited by Michele Acuto, Madeline. Carr and Carolin Kaltofen, 13–23. Palgrave Macmillan.

Nicolini, Davide. 2009. "Zooming in and Out: Studying Practices by Switching Theoretical Lenses and Trailing Connections." *Organization Studies* 30 (12): 1391–418.

Pasquale, Frank. 2014. "Opinion | The Dark Market for Personal Data." In *The New York Times*. October 16, 2014, Sec. Opinion. https://www.nytimes.com/2014/10/17/opinion/the-dark-market-for-personal-data.html.

Reubi, David. 2018. "Epidemiological Accountability: Philanthropists, Global Health and the Audit of Saving Lives." *Economy and Society* 47 (1): 83–110.

Rich, Emma, and Andy Miah. 2017. "Mobile, Wearable and Ingestible Health Technologies: Towards a Critical Research Agenda." *Health Sociology Review* 26 (1): 84–97.

Rikap, Cecilia. 2021. *Capitalism, Power and Innovation: Intellectual Monopoly Capitalism Uncovered*. London: Routledge.

———. 2023. "The Expansionary Strategies of Intellectual Monopolies: Google and the Digitalization of Healthcare." *Economy and Society* 52 (1): 110–36.

Ruckenstein, Minna. 2014. "Visualized and Interacted Life: Personal Analytics and Engagements with Data Doubles." *Societies* 4 (1): 68–84.

Ruppert, Evelyn, and Stephan Scheel. 2019. "The Politics of Method: Taming the New, Making Data Official." *International Political Sociology* 13 (3): 233–52.

Ruppert, Evelyn., E. Isin, and Didier Bigo. 2017. "Data Politics." *Big Data & Society* 4 (2): 1–7.

Rushton, Simon, and Owain David Williams. 2012. "Frames, Paradigms and Power: Global Health Policy-Making under Neoliberalism." *Global Society* 26 (2): 147–67.

Sanofi. 2016. "On the Occasion of 'World Diabetes Day' the 7th National Awareness Campaign on Diabetes Marks the Launch of 'Be Healthy, Be Mobile' Initiative." In *Sanofi*. Accessed November 6, 2023. https://www.sanofi.com.eg/dam/jcr:3c3e00f4-97d6-436f-82f2-7d26bbd31c44/The-7th-National-awareness-campaign-on-diabetes-marks-the-launch-of.pdf.

Schmidt-Wellenburg, Christian, and Frédéric Lebaron. 2018. "There Is No Such Thing as 'the Economy'. Economic Phenomena Analysed from a Field-Theoretical Perspective." *Historical Social Research* 43 (3): 7–38.

Sending, Ole Jacob. 2015. *The Politics of Expertise: Competing for Authority in Global Governance*. Ann Arbor: University of Michigan Press. https://www.press.umich.edu/4016693/politics_of_expertise.

Sparke, Matthew. 2020. "Neoliberal Regime Change and the Remaking of Global Health: From Rollback Disinvestment to Rollout Reinvestment and Reterritorialization." *Review of International Political Economy* 27 (1): 48–74.

Star, Susan Leigh. 1999. "The Ethnography of Infrastructure." *American Behavioral Scientist* 43 (3): 377–91.

Star, Susan Leigh, and Karen Ruhleder. 1996. "Steps toward an Ecology of Infrastructure: Design and Access for Large Information Spaces." *Information Systems Research* 7 (1): 111–34.

Tichenor, Marlee, Sally E Merry, Sotiria Grek, and Justyna Bandola-Gill. 2022. "Global Public Policy in a Quantified World: Sustainable Development Goals as Epistemic Infrastructures." *Policy and Society* 41 (4): 431–44.

Tichenor, Marlee, and Devi Sridhar. 2020. "Metric Partnerships: Global Burden of Disease Estimates within the World Bank, the World Health Organisation and the Institute for Health Metrics and Evaluation." *Wellcome Open Research* 4: 35.

Ulrich, Beck. 1992. *Risk Society: Towards a new Modernity*. Sage: London.

Walters, William. 2002. "The Power of Inscription: Beyond Social Construction and Deconstruction in European Integration Studies." *Millennium* 31 (1): 83–108.

WHO and ITU. 2017. *Be He@lthy, Be Mobile: Annual Report 2017*. Geneva: World Health Organization and International Telecommunication Union . Accessed November 6, 2023. https://iris.who.int/handle/10665/326498.

———. 2018. *Be He@lthy, Be Mobile Annual Report 2018*. Geneva.

———. 2019a. *A Handbook on How to Implement mTB-Tobacco*. Geneva: World Health Organization. Last accessed November 6, 2023. https://iris.who.int/bitstream/handle/10665/325243/9789241515900-eng.pdf?sequence=1.

———. 2019b. *Be He@lthy, Be Mobile: Personas Toolkit* Geneva: World Health Organization. Accessed November 6, 2023. https://iris.who.int/handle/10665/329947.

———. 2020. *Digital Health Platform: Building a Digital Information Infrastructure (Infostructure) for Health*. Geneva: World Health Orgaization and International Telecommunication Union. Accessed November 6, 2023. https://www.itu.int/pub/D-STR-E_HEALTH.10-2020.

———. 2022a. *Be He@lthy Be Mobile: A Toolkit on How to Implement MyopiaEd*. Geneva: World Health Orgaization and International Telecommunication Union. https://www.who.int/publications/i/item/9789240042377.

———. 2022b. *Be He@lthy Be Mobile: Implementing Doing What Matters in Times of Stress in Chatbots*. Accessed November 6, 2023. https://www.who.int/publications/m/item/implementing-doing-what-matters-in-times-of-stress-in-chatbots.

WHO. 2001. "Macroeconomics and Health: Investing in Health for Economic Development." In *Report of the Commission on Macroeconomics and Health*. WHO Commission on Macroeconomics and Health.

———. 2008. *2008–2013 Action Plan for the Global Strategy for the Prevention and Control of Noncommunicable Diseases*. Geneva: World Health Organization.

———. 2017. *The WHO STEPwise Approach to Non-Communicable Disease Risk Factor Surveillance: The STEPS Surveillance Manual*. Geneva: World Health Organization. Accessed November 6, 2023. https://who.int/teams/noncommunicable-diseases/surveillance/systems-tools/steps/manuals.

———. 2021. *Global Strategy on Digital Health 2020–2025*. Geneva: World Health Organization.

———. 2023. *STEPwise Approach to NCD Risk Factor Surveillance (STEPS)*. Geneva: World Health Organization. Accessed November 6, 2023. https://www.who.int/teams/noncommunicable-diseases/surveillance/systems-tools/steps.

Williamson, Ben. 2014. "Policy Networks, Database Pedagogies, and the New Spaces of Algorithmic Governance in Education." In *Proceedings of the 9th International Conference on Networked Learning*, edited by S. Bayne, C. Jones, M. de Laart, T. Ryberg and M. Sinclair, 547–54.

World Bank. 1993. *World Development Report 1993: Investing in Health*. New York: Oxford University Press.

Littoz-Monnet, Annabelle (2024) Knowledge Machineries and Their Objects of Expertise. Knowing Bodies, Moves, and Moods through "Mobile Health" Data. *Global Studies Quarterly*, https://doi.org/10.1093/isagsq/ksae061