

Media Matter

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Abstract: The present contribution maps materialist advances in media studies. Based on the assumption that matter and materiality constitute significant aspects of communication processes and practices, I introduce four fields of inquiry – technology, political economy and labour, the body, and ecology – and argue that these perspectives enable more comprehensive understandings of the implications of contemporary, technologically afforded forms of interaction. The article shows how each perspective can balance apologetic and apocalyptic approaches to the impact of, in particular, digital technologies, before it demonstrates the applicability of an integrated framework with reference to the technopolitics of NSA surveillance and the counter-practices of WikiLeaks.

Keywords: Materialism, digital media, networks, communication, technology, political economy, ecology, body, Edward Snowden, NSA, WikiLeaks

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1. Introduction

The present article takes up the issue of materiality in media and communication research and maps an emergent field with reference to four areas of materialist inquiry: technology, political economy and labour, ecology, and the body. I introduce each perspective and illustrate its specific capacities through concrete examples. Subsequently, the cases of digital surveillance and countersurveillance serve to illustrate the applicability of an integrated framework. Initially, however, the present approach will be contrasted to preceding attempts to map materialist advances in the field of media and communication studies.

In their anthology *Communication Matters*, Packer and Crofts Wiley (2012) have argued that “the immateriality of communication” has long been an “ontological assumption for mainstream theory in the fields of communication, rhetoric, and media studies” (3). In their call for a turn away from a privileged focus on content and meaning, the authors introduce “materiality as a corrective” (Ibid.) and group the contributions to their edited volume under such headers as economy, discourse, space, body, and technology.

Providing a different typology of materialist advances and directing specific attention to digital technologies, Casemajor (2015) has identified four schools of thought that speak to a material turn in media research: German media theory, software studies, studies of electronic texts and hypertexts, and forensic inquiries. Associating these approaches with the works of Kittler (1990), Manovich (2013), Hayles (2002), and Kirschenbaum (2008) respectively, Casemajor points out that the mentioned frameworks “provide tools to critique the trope of immateriality [in traditional studies of new media]”, but do not “address frontally the political dimension

of digital materialism” (10). To mitigate this shortcoming, she proposes two additional lenses, namely ecology and political economy.

The present contribution is indebted to both Packer and Crofts-Wiley’s (2012) mapping of the field and Casemajor’s (2015) re-politicisation of particular materialist outlooks. In contrast to Casemajor, however, I perceive politics as an integral aspect of all materialist inquiries – not only those concerned with environmental impacts and political economy. Not least, the works by Galloway (2004), Starosielski (2015), Hogan (2015), and Hayles (2012) attest to this. Also, I choose to subsume Packer and Crofts-Wiley’s (2012) categories of discourse and space under the headers of technology; economy and labour; the body; and ecology. I perceive the materiality of discourse and the mediated construction of space as sufficiently covered in these areas of inquiry. In sum, the present article argues for the inherently political nature of any approach concerned with material modalities, functionalities, and effects of contemporary digital networks and communication technologies.

The purpose of the turn towards materialism taken here is not to replace or render invaluable alternative approaches in media and communication studies. Focus on rhetorical strategies, meaning, interpretation, and content always have been, and rightfully still are, very important for the field. Not least the work by Hall (1977) shows how a combination of text-centric, contextual, and material approaches can lead to important insights into processes, practices, and effects of mediated communication. The re-mapping proposed here advocates the inclusion of new aspects to enable insights that remain outside the purview of established advances.

At a theoretical level, I am indebted to approaches often subsumed under such headers as new materialism (Coole and Frost 2010) or new vitalism (Bennet 2010; Fraser, Kember, and Lury 2005). The present contribution, however, limits its inquiry to assess implications of these lines of thought for the field of media and communication studies. This way, aspects regarding such issues as material agencies, the status of the human, or the contingencies of processes of materialisation highlighted by the scholars mentioned above, form an important theoretical background that informs the four fields of materialist inquiry proposed in the present article.

As will become clear in the sections introducing each of the four lenses, physicality, bio-chemical processes, and forms of non-human agency are not the only iterations of materialism relevant for the present article. In particular the parts on political economy and labour as well as on ecology will show that a Marxist strain of materialism highlighting the dialectic nature of socio-technical change in new media environments (Fuchs 2014a&b; Kline, Dyer-Withford, and de Peuter 2003; Fuchs and Mosco 2012), as well as a cultural materialism associated with the Frankfurt School of critical theory (Enzensberger 1974) and the Birmingham School of cultural studies (Hall 1977) constitute points of reference that are important for a proper contextualisation of the present study. As Fuchs (2014b, 78) remarks, with an eye on Smythe’s (1977a) criticism of Enzenberger’s (1974) concept of the consciousness industry, critical media and communication research must give attention to “the media’s capital accumulation strategies [...] coupled to its role as mind manager”. Precisely such an inclusive and balanced account that does not simply dismiss competing approaches, but combines and critically re-appropriates them, is an aspiration shared by the present inquiry.

In sum, what emerges as the materiality of (digital) media in the present text is a combination of technical aspects of infrastructure and carrier media, geophysical and biochemical processes and flows, economic conditions and relations of production,

bodily effects, practices and adaptations, as well as crystallisations and sedimentations of practices of use and appropriation. I argue here that none of these frames alone can comprehensively account for what digital media are and do. Neither is it possible to fuse all these frames into one determinate overarching perspective. Rather each of them contributes with unique and crucial critical questions and perspectives that refract and rearticulate, in specific ways, the ultimately contingent object of inquiry. Therefore, they should be seen as fragmentary epistemologies in need of combination, rather than ontological absolutes that replace one another as results of ever-expanding processes of knowledge production.

2. Media Matter: Four Areas of Materialist Inquiry

Technology, political economy and labour, the human body, and ecology constitute important elements of, and contexts for, the operation of media – digital and otherwise. The present section introduces these four fields of materialist inquiry and argues that through each of them salient new aspects of the varying relations between digital technologies, societies, and politics can be highlighted and opened up for critical investigation.

2.1. Technology Matters: The Infrastructure and Material Practices of Digital Networks

Taking his cues from scholars such as Heidegger and Simondon, Bernard Stiegler (1998) has argued for a reevaluation of technology in Western philosophy. According to Stiegler, most Western thought is based on an ontological distinction between living organisms and dead matter, a dichotomy that relegates formed matter – technology – to a secondary status and a variable dependent upon the preceding two categories. Extending this binary framework, he launches the hypothesis that “between the inorganic beings of the physical sciences and the organic beings of biology, there does indeed exist a third genre of ‘being’: ‘inorganic organized beings’ or technical objects” (17).

Various concepts and metaphors have been employed in attempts to account for possible roles and functions of this ‘third genre of being’, digital or otherwise. Combining a materialist outlook with a polemically anti-humanist stance, Kittler (1990) has drawn attention to the various ways through which technologies influence, and indeed determine, the human condition. His approach redirects focus from the human subject, meaning, and content to the gritty material technologies, networks, and operations through which humans interact and intersect with their surrounds, and that profoundly predispose human conduct and the formation of subjectivities and practices.

Such a focus merits the question of how much influence technology does have on socio-political developments. Avoiding an either-or response to this problem, Dafoe (2015) has questioned the value of radical dichotomies such as those between social constructivism and technological determinism. Instead, he proposes a scalar model that directs attention to tendencies, ambiguities, and ambivalences in the various relations between subjects, societies, and technologies. He writes, “[t]he question should not be [...] whether technological determinism is right or wrong, but a set of questions of degree, scope, and context” (1050) that enable an understanding of technology’s manifold and ambiguous functions and effects, and that move into view its varying degrees of autonomy and power. Dafoe’s (2015) pragmatism enables a productive piecemeal approach to the specific politics of material technologies and their distinct contexts and practices of use.

In an era of apparently ephemeral digital networks and virtual worlds, matter still matters. As Sassen (2002) has argued, “digital networks are embedded in both the technical features and standards of hardware and software, and in actual societal structures and power dynamics” (366). In her call for a sociological grounding of projections regarding possible impacts of digital technologies, she urges the development of “analytic categories that allow us to capture the complex imbrications of technology and society” (365). Such a move brings into view the infrastructural basis, the specific technological affordances, and the institutional underpinnings of contemporary communication networks, and can productively address ambivalent practices of use, re-appropriation, subversion, resistance, maintenance, repair, and others (Nardi and O’Day 1999; Galloway 2004; Starosielski 2015; Parks and Starosielski 2015; Hogan 2015; Hogan and Shepherd 2015).

Critical approaches that focus on material dimensions of digital technologies often alert to infrastructural aspects, such as the politics of fibre-optic cables (Starosielski 2015), server parks (Hogan and Sheperd 2015; Hu 2015), or software protocols (Galloway 2004). Starosielski (2015), for instance, directs attention to the intercontinental cable system that forms the material basis of contemporary networked interaction. In line with the argument made by Galloway (2004) in relation to software protocols and code, she challenges received ideas of a distributed nature of the Internet and highlights its physical, semi-centralised architecture that channels most traffic through particular bottlenecks such as key landing stations, exchange points, or large-scale routers. In a second step, she contextualises the described infrastructure further by situating it historically and analysing its imbrications in specific local settings.

Inspired by the media archaeological school connected to authors such as Ernst (2013) and Parikka (2012), Starosielski (2015, 21) uses the term “network archaeology” to theoretically ground her approach.¹ In historicising “social practices, built architectures, and natural environments” (21), she highlights crucial material aspects of contemporary global communication systems that, according to her, are “obscured in the thin lines of the network diagram” (15). This reasoning is in line with Hu (2015) who has argued that cloud computing today constitutes the foremost manifestation of digital networks. According to her, these technologies can only be properly analysed from a position that connects back to their historical precedents and that refrains from being “fully immersed in either [the cloud’s] virtuality or its materiality” (xx).

Also at the level of software, technology matters. Today, the way algorithms pre-assess, filter, and sort the information that becomes available to human decision makers has profound implications for politics, society, culture, and the economy (Steiner 2012; Andrejevic 2013; Pöttsch 2015; O’Neill 2016; Clough 2016; Hill, Kennedy and Gerrard 2016; Chamayou 2015). As argued by Winthrop-Young (2013), human subjectivities, technologies, and the operations and procedures interconnecting them are mutually constitutive. When perceived in this manner, human agency emerges as only one among many components of complex socio-technical networks, and as predisposed by material technologies and processes. The impact of a combination of largely economically motivated fake news sites and

¹ The term “network archaeology” was coined by Cheek, Soderman, and Starosielski (2013, 6) who distinguish it from a media archaeological tradition: “Replacing ‘media’ with ‘network’ marks a difference between focusing on media technologies (and their representational results) and the analysis of network structures themselves, tracing the non-representational paths, addresses, and intersections of various objects and ideas”.

Facebook's edge rank algorithms on U.S. politics and public debate that was recently highlighted by Herrman (2016) provides a good case to illustrate this material dimension of an increasingly dense intermingling of hardware, software, and wetware (Winthrop-Young 2010) in contemporary techno-politics.

Taking note of such advances, a materialistically inflected media studies, such as the one proposed here, can balance scholarly attention to content and meaning with detailed descriptions of the specific technologies and operations of storage and dissemination and their respective contexts of use and (re)appropriation. This way, the role of media can be addressed across a variety of layers and registers from large-scale technical systems, software protocols, and institutions to local settings and daily practices. In particular, the often-assumed disembodied qualities of information and the apparently elusive and progressive nature of increasingly ubiquitous digital technologies seem to necessitate such an approach that redirects focus toward the physical, practical, and infrastructural dimensions of apparently immaterial applications and services.

2.2. Capitalism Matters: Political Economy, Labour, Money and Commodities in Digital Communication

A growing number of scholars in media and communication studies have argued for the necessity of focusing on continuities as well as ruptures when dealing with technological innovations, and have demanded a proper historicising of so-called new media. Kline, Dyer-Witherford, and de Peuter (2003), for instance, have pointed out that received socio-economic frames often condition possible uses of new applications and devices. As such, not the technological affordances alone, but their embedding in particular economic, social, and political contexts emerge as the main focus of materialist inquiries. They write: "The paradox that is often lost in [...] visions of digital progress is that genuinely new technocultural innovations [...] are being shaped, contained, controlled, and channeled within the long-standing logic of a commercial marketplace dedicated to the profit-maximising sale of cultural and technological commodities" (21). At the same time, they caution against apocalyptic notions of a digital dystopia in pointing to genuinely progressive socio-technical potentials of digital networks. The relation between technological innovations and socio-economic frameworks, they argue, is dialectic rather than deterministic.

Critical materialist inquiries can address the dialectical relation between media, economy, and politics in three different manners. Firstly, attention can be directed to the continued salience of questions of corporate and state ownership and control of apparently distributed networks and media. Secondly, the specific forms of digital labour and capital accumulation afforded by new technologies can be investigated, and thirdly, the raw material underbelly of global relations of production, distribution, disposal, and exploitation connected to the digital economy can be moved into the purview of media studies.

The focus of the first line of inquiry points to the fact that in relation to new media technologies, issues of political economy and ownership still matter. As Wood (2009) notes, digital era tropes such as participatory culture or media ecology often function as "commercial gloss" (170) that veils underlying continuities at the level of institutional ownership and control. Connecting such criticism to issues of democracy and deliberation, McChesney (2013) has identified an increasing disconnect between corporate media and the public that, according to him, also extends into the realm of digital technologies and the Internet. Striking a dystopic note, he writes that "the tremendous promise of the digital revolution has been compromised by capitalist

appropriation and development” (97) creating a system where state and corporate interests work “hand in hand” (117), posing significant challenges for democratic processes. The tremendous political and economic power wielded by big media players of the digital era such as Google, Facebook, Microsoft and others clearly attests to this fact.

Material perspectives focusing on economic aspects, however, are not limited to critiques of institutional ownership and control. Highlighting the second aspect mentioned above – labour in the digital economy – scholars such as Fuchs (2012, 2014a&b, 2017), Schiller (2016), Mosco (2016), and Andrejevic (2007) have employed a Marxist lens to critically address the changing practices and structures of economic exploitation in digital networks. Fuchs (2014a) in particular addresses the business models of companies such as Google, Facebook, or Microsoft that are based on hidden affordances of apparently cost-free applications and services that make possible a rigid mapping and tracking of users for economic purposes, and that exploit users’ daily activities as free labour in cycles of capital accumulation. This immaterial form of labour in digital networks poses some challenges for classic Marxist theory.

Taking the thought of Smythe (1977b) as a point of departure, Fuchs (2012, 2014b, 75-95) has suggested a transition from an audience commodity to a prosumer commodity that is exploited in new media environments. Criticising the notion of immaterial labour advanced by Hardt and Negri (2005) as tacitly implying a mind-matter division that results in two fundamentally different types of work, Fuchs (2014) asserts that “information work is [...] not detached from nature and matter, but is material itself” (252). As a result, also digital, or informational, labour becomes part of economic processes of exploitation and capital accumulation and can, hence, be analysed through a (slightly adjusted) Marxist lens.²

According to Fuchs (2012, 2014a&b), social networking sites, cloud services, and search engines base their business models on unpaid digital labour that appropriates individual user data and contributions while keeping users in a form of dependency based on a threat of anonymity and social exclusion. Complex and constantly evolving data mining and processing applications afford an increasingly fine-grained and ubiquitous “exploitation of the Internet prosumer commodity” (2012, 139) that eliminates the distinction between play and labour, between on- and off-line conduct, and creates a form of “digital housework” (Fuchs 2017, 5) that produces vital goods and services free of charge. On the basis of similar observations, Andrejevic (2007, 2) has warned that contemporary media ecologies resemble “enclosures” that facilitate an increasingly fine-grained economically and politically motivated mapping and profiling of users.

In spite of this embedding of new technologies in received socio-economic structures, digital media also enable a variety of innovative and progressive counter-practices pointing to opportunities for resistance to the received frames of informational or cognitive capitalism. As Fuchs (2014a, 243-247) and Sandoval (2015), among others, have shown, even when perceived from the vantage point of a dominant capitalist economy, certain digital technologies do indeed hold potentials for genuine participation and empowerment. Ad- and tracker-free, non-commercial platforms such as Wikipedia or Diaspora* enable forms of co-operative work that generate value beyond capitalist logics of accumulation, exploitation, and

² For a detailed explication of the production of surplus value in digital environments see Fuchs (2014a, 103-105 as well as Fuchs and Mosco 2012, 132-134).

commodification, and in this way point to a dialectic relation between socio-technical and economic developments. In a similar way, shareware and Creative Commons products offer free alternatives to expensive software solutions offered by commercial actors, tacitly undermining capitalist market logics.

Besides the two aspects highlighted above – ownership and control as well as digital labour – a third vantage point directs attention to a globalised political economy of new media. Here, material structures and means of exploitation connected to the production, distribution, operation, and disposal of contemporary digital technologies move centre stage in critical analysis. The works by Maxwell and Miller (2012), Gabrys (2011), Parikka (2015), Reading (2014), Qiu (2016), Mosco (2016), Woodcock (2016), and Taffel (2015), among others, show how resource extraction, manufacturing, transportation, servicing, and waste handling connected to the new media economy pose significant challenges to workers, societies, and the environment at a global scale. They argue that issues such as child labour, conflict minerals, ecological depredation, and insufficient health and safety standards are direct consequences of low prices that allow for increasingly rapid, media-fuelled cycles of innovation in industrialised nations that lead to the quick transformation of fully functional devices into disposable rubbish.³ Drawing attention to such issues as changing working conditions, increasing automation, and machine-facilitated outsourcing, Dyer-Witheford (2015) and Woodcock (2016) alert us to new forms of precariousness among a globalised workforce that, according to them, is often caused by seemingly liberating and progressive digital technologies.

To provide a few more examples, Reading (2014) has argued for the necessity of reconnecting the apparently ephemeral digital memory of cloud services and mobile media to their materialist underpinnings in a globalised political economy that is embedded in colonialist continuities and imperialist logics of exploitation and oppression. Woodcock (2016), on the other hand, criticises the poor working conditions, extant surveillance, and low wages of contemporary call centres, before pointing to potentials for new forms of resistance and collective mobilisation emerging from these locations. Lastly, Qiu (2016) connects the exploitation of immaterial labour and the prosumer commodity to aberrant working conditions and low pay in Foxconn factories and resource extraction projects coining such terms as “iSlavery” and “Appconn” to sum up his arguments.

The economic lens of materialistically inflected media studies brings together the three somewhat divergent approaches introduced in the present section, and this way facilitates a critical reorientation of the field called for by e.g. Maxwell and Miller (2012).

2.3. Media and Bodies: Embodiment, Affect, Assemblage

Media studies have long been somewhat inattentive to the human body and affect. As a result, questions of content and meaning were often reduced to conscious cognitive endeavours such as readings and re-readings of given sign systems in varying contexts. From the 1990s onward, however, a group of predominantly feminism-oriented scholars challenged assumptions of a merely rational and

³ The game *Phonestory* (Molleindustria 2011) exposes, in a satirical manner, the political economy behind production and disposal of smart phones. Apparently due to this challenging content, the game was banned from Apple’s App Store shortly after its release (Brown 2011). See also Parikka (2015, 89-91) and Lager Vestberg (2016).

disembodied process of understanding. They opened up new fields of inquiry in media research that were inspired by phenomenological theories of perception and a distinction between a static physical body and contingent practices of embodiment (Haraway 1991, 195-197; Hayles 1999, 196; Sobchack 2005, 2-4).

Technical media play an important role in processes through which contingent bodily potentials for identity and practice are selectively activated, negotiated, or suppressed. On the one hand, as argued above, an affective kind of reception points to the significance of pre-rational and bodily forms of engagement with media content (Sobchack 2005). On the other, individual bodies either serve as expressive media through which different potentials for embodiment are represented and realised (Hayles 1999), or they enter into complex entanglements with their technical surrounds that become veritable 'extensions of man' in the sense of McLuhan (1964). In all cases, the assumed pre-eminence of a rational and active human subject surrounded by passive objects is fundamentally challenged.

Besides such theoretically inflected accounts, the body also emerges as a biophysical entity tightly interwoven with socio-technical and natural environments (Grossman 2016). On the one hand, as the section on political economy has highlighted, the manufacture, maintenance, servicing, and disposal of media and communication technologies has impacts on concrete biological human bodies that are exposed to poisonous substances, stress, or dangerous and unhealthy work conditions (Maxwell and Miller 2012; Taffel 2015; Parikka 2015; Reading 2014; Qiu 2016; Grossman 2016). On the other hand, increasingly dense and ubiquitous technical environments to a growing extent mould and change human bodies by impacting upon evolutionary processes. Hayles (2012, 10) has coined the term 'technogenesis' to account for such a co-evolution of human beings and technological objects and networks. In all cases, the body emerges as interwoven with complex socio-technical and biophysical environments that make a clear demarcation between the involved entities at times difficult to maintain.

According to Hayles (2012), the term 'technogenesis' encapsulates the varying processes through which the biological human body and technology mutually shape and change one another. In her book, she documents a series of concrete effects that contemporary digital environments exert upon physical bodies and brains. One instance she describes is the process through which digital devices systematically privilege the cognitive mode of hyper-attention above deep attention, triggering complex bodily adaptations in the process.⁴ Acknowledging the significance of each mode of cognition, Hayles cautions that contemporary digital technologies entail an unprecedented unilateral dependence on the former mode, as such producing potential negative long-term consequences. She warns that such factors as the inherent plasticity of the human brain, epigenetic adaptations, as well as the so-called Baldwin effect, point to possible long-term physical and biological impacts of digital technologies (Hayles and Pöttsch 2014, 98-99).⁵ It becomes apparent that technological changes, practices of use, and biological adaptations mutually

⁴ While deep attention is characterised by a high threshold for boredom and enables long-term in-depth studies of limited subjects, hyper-attention is dependent on repeated stimulations and enables a quick scanning and mapping of vast amounts of information (see Hayles 2012, 69).

⁵ Epigenetics point to environmental influences on human genetics that are conveyed across generations, while the Baldwin effect explains how genetic variations actively reconfigure their environments to further their particular variations (Hayles 2012, 11-14; see also Hayles and Pöttsch 2014, 98-99 and Blackman 2016, 7-8).

predispose and reinforce one another, thus unsettling an engrained anthropocentrism in ‘traditional’ media and communications research.

In the cases highlighted above, the human body becomes conceivable less as an autonomous actor in control of certain technologies and more as a component in complex socio-technical and biophysical systems or human-machine-nature assemblages. Haraway (1991) and Hayles (1999) have used terms such as the ‘cyborg’ and the ‘posthuman’ respectively to question and challenge rigid distinctions between humans and their natural and technical surrounds, while Latour’s (2005) actor-network theory equips objects – technical and otherwise – with forms of agency previously reserved to human beings. In all instances, the received idea of a pre-eminence of an autonomous, liberal humanist subject is rejected and the biophysical body is reinserted into complex socio-technical systems and processes as just another object with certain “agentic capacities” (Coole 2013) – as only one form of a wider “vital materiality” (Bennett 2010, 112).

The present section has reframed the biological human body, not only as a source of various contingent forms of embodiment, but also as a material component in complex socio-technical and biophysical environments. Materialist approaches adopting the body as an analytical lens can account for the various ways through which humans, technologies, biophysical systems, and politics interact and change with one another in contemporary, networked lifeworlds.

2.4. Media Ecology: Beyond the Metaphor

The metaphorical use of the term media ecology is often connected to the works of Innis (1951), McLuhan (1964), and Postman (1985) and summarises their attempts to provide holistic explanations for the evolution and effects of media technologies. In general, the media ecological tradition perceives technical media as forming complex and adaptive environments that influence the perception, cognition, and performances of human subjects in manifold ways. Combining linear models of technically mediated communication (Shannon and Weaver 1949) with cybernetic approaches (Bateson 1972), media-ecological thinking enables attention to mutual interferences between multiple human and non-human actors embedded in self-organising systems that aim at reducing entropy through feedback-loops and subsequent adaptations. This strain of theory has provided inspiration to such influential traditions as actor-network theory (Latour 2005), posthumanism (Haraway 1991; Hayles 1999), vital materialism (Bennett 2010), or theories of mediatisation (Hjarvard 2008; Schofield Clark 2009). Acknowledging the significant contributions of this metaphorical tradition of research, I will now turn to advances that employ the term ecology in a literal sense to highlight important blind spots in contemporary thinking about materiality, media, and the physical environment.

In their critical study *Greening the Media*, Maxwell and Miller (2012) propose a fundamental change in outlook for media studies. Challenging hypes of new communication technologies as inherently democratic and ‘green’, they describe a variety of negative societal and environmental impacts of the digital economy. They connect these findings to underlying capitalist logics of exploitation and capital accumulation, and both highlight the growing ecological footprint of apparently immaterial goods and services as well as challenging received mantras of a digitally enhanced, cleaner and more just “post-industrial capitalism” (5). In a similar vein, Maxwell, Raundalen, and Lager Vestberg (2015) have criticised a prevailing consensus in media and communication research that excludes environmental issues and questions of global flows of raw materials, energy, and workers. They

argue that the term media ecology, so far, has served as “a utopian sounding metaphor of a natural media eco-system” that has helped to successfully eschew “the dirty reality of a polluting, industrial, class-divided system” (xiii) that is based on cycles of conspicuous consumption and increasingly rapid disposal of technical devices.

Indeed, the environmental footprint of the digital industry is growing rapidly. Gabrys (2015), for instance, highlights the increasing energy demands of “seemingly immaterial” (3) digital devices and services. According to her, the energy needed to power this segment of the global economy amounted to around 2% of total worldwide consumption in 2011 – roughly the same level as for the aviation industry – with an expected increase to 3% by 2020 (Ibid.). The energy required for powering digital technologies and infrastructures, however, is dwarfed by the costs of their manufacturing and their increasingly rapid disposal. Maxwell and Miller (2012, 93-94) draw attention to the proportions of global production of resources that go into the ICT sector and detail how mining often depletes the environment, exploits (child) labour, and fuels sectarian violence and civil wars. Similarly, Orisakwe and Frazzoli (2010, 44) show that even though consumption patterns in industrialised nations account for the major part of the digital economy, electronic debris is predominantly processed in the global South with devastating impacts on the environment and human health. Only a fraction of e-waste is recycled, while most of it is handled illegally and disappears in global “hidden flows” (Cobbing 2008, 5). Damjanov (2017) has recently extended this environmental focus to the global commons of outer space, highlighting the problems caused by defunct communication satellites and other orbital debris.

A similar critical materialist stance, which focuses on the embedding of digital technologies in natural environments, is reflected in Parikka’s (2015) exploration of the mineral and chemical components and energy flows at the heart of the contemporary digital economy. Criticising Kittler’s (1990) materialism for merely focusing on the operations of ready-made technological products, while obscuring the processes through which these products are manufactured, distributed, maintained, and disposed of, Parikka alerts to the significance of what he terms a critical geophysical dimension in media research. According to him, such a focus enables attention to the ecological, social, and political costs connected to resource extraction, production, and disposal of digital devices, and contextualises apparently new and clean technological solutions with reference to geological and socio-economic long-term trajectories and processes.

In all the cases highlighted above, a materially inflected focus re-appropriates the discourse on ecology and puts it to use in environmental contexts. This move makes visible new and previously understudied areas that merit the critical attention of scholars in media and communication studies (Maxwell and Miller 2012; Casemajor 2015). However, it does not render the metaphorical dimension of the concept of media ecology redundant or useless. As Taffel (2015) has observed, the circulation of energy, goods, and material resources in the digital economy has environmental impacts, but to understand properly the various relations between these units and their embeddedness in wider socio-technical systems requires a more abstract understanding of the term.

Environmental aspects constitute only one element of complex media ecologies. Critical materialist approaches re-enlist an extended, metaphorical understanding of the term ecology to investigate the complex, dynamic, and adaptive systems, as well as the historical contexts, in which the environment, concrete bodies, technological

objects, social practices, economic and political relations, as well as material and energy flows, interoperate, and that predispose possible forms of interaction and exchange (Bennett 2010; Coole and Frost 2010; Parikka 2015; Taffel 2015; Starosielski 2015; Hogan 2015; Grossman 2016). As such, the term media ecology can productively be brought back into the discourse to “address frontally the political dimension of digital materialism” (Casemajor 2015, 10). This move both maintains the autonomy of each of the four lenses proposed in the present article, while it at the same time yields new insights into the complexities of their interplay. This way, new forms of agency as well as new opportunities and challenges for contemporary politics can be identified and critically addressed.

Having proposed a heuristic division of contemporary critical materialist media studies into four areas of inquiry – technology, economy and labour, the body, and ecology – I will now provide a case study of digital surveillance and counter-surveillance to highlight some implications of the changes in perspective suggested above.

3. The Politics of Media Materialism: Surveillance and Counter-Surveillance in Digital Networks

The current, seemingly frictionless global exchange of digital data makes possible new forms of production, mass communication, and peer-to-peer interaction. Potentials for empowerment, participation, and wealth, seemingly enabled by an incumbent digitisation of economy and politics, have been repeatedly asserted (Shirky 2011; Jenkins 2006; Ford, Green and Jenkins 2013; Schmidt and Cohen 2013; Mason 2015).⁶ However, as I have argued above, such projections often remain oblivious to the inherently ambivalent nature of these technologies’ affordances and of the contradictory socio-political, economic, and ecological contexts within which they operate. These frames, however, channel and predispose possible uses as well as effects and often point to unintended consequences or potentials for exploitation and control (Sassen 2002; Galloway 2004; Andrejevic 2007; Fuchs 2012, 2014a&b; Starosielski 2015; Dyer-Witheford 2015; Woodcock 2016).

The present section will explore these themes through a material perspective on technologies and practices of digital surveillance and counter-surveillance. In doing so, the article activates an extended ecological understanding that combines the four lenses introduced above to provide a nuanced and multi-faceted understanding of the politics and counter-politics of digital networks.

⁶ A most recent iteration of this strain of research is Mason (2015) who, taking a techno-determinist stance, argues that the unlimited shareability of informational goods enabled by digital networks stands at odds with capitalist logics of scarcity and will, as such, almost automatically usher in an era of post-capitalism that “will deliver some form of social justice spontaneously” (144). Of course, this thought is based on the misunderstanding that digital data is disembodied data that emerges independent of physical infrastructure, material devices, and resource extraction. Mason also apparently assumes that all basic needs of the “networked individual, who is the bearer of the post-capitalist society” (Ibid.) can be delivered in and through digital networks, again assuming an immateriality that in reality does not exist. In works such as Mason’s, pressing questions such as who and what feeds the workers and machineries producing and reproducing shareable digital data, or how capitalist logics of exploitation and capital accumulation evolve in encounters with concrete new technologies remain obscured.

3.1. Dataveillance, Networks, and Non-Human Agencies

Since 2013, former National Security Agency (NSA) contractor Edward Snowden has leaked a series of documents revealing the massive surveillance of global communication flows by state agencies⁷. In the aftermath of the release, attention has been directed to such important issues as who is surveyed, what types of data are gathered, what these data might express about a particular individual or group, and what political fallouts these practices might have (Goldfarb 2015; Lyon 2014; Bauman et.al. 2014). Materialistically-inflected approaches contribute additional questions and provide the conceptual and methodological tools to productively address these: What concrete technologies and infrastructures make mass surveillance possible? How are data gathered and processed? What are the institutional, economic, and ecological frames predisposing and possibly subverting these activities? How is mass surveillance implemented and/or resisted at the level of everyday practices?

The files released by Edward Snowden revealed that the NSA and the British General Communications Headquarters (GCHQ) exploit the semi-centralised material infrastructure of the Internet highlighted by, for instance, Galloway (2004), Starosielski (2015), and Hu (2015) to regularly tap into global data flows. Physical access to intercontinental fibre-optic cables, major exchange points, and the servers of key ISPs enables the agencies to re-route, store, and assess bulks of communication data including browser histories, social networks, chat, email, voice, image, and video (Greenwald 2013; Greenwald and MacAskill 2013; Lyon 2014; Bauman et.al. 2014). Access to mobile phone towers and geolocation tools enables a largely automated tracking and mapping of movement and connection data to identify potentially threatening patterns of association and behaviour (Gellman and Soltani 2013; Grothoff and Porup 2016). In addition, state agencies directly target local area networks, specific workstations, or individual computers through methods of inserting both code-based and physical malware (Gallagher 2013; van der Velden 2015).⁸

The massive scope of this information gathering requires large installations to store and assess the collected data. Focusing on the complex ecologies surrounding NSA server parks, Hogan (2015) connects virtual surveillance to concrete geographies, local communities, and economic as well as environmental concerns and this way productively combines a series of the material approaches highlighted in the present article. In honing in on the NSA's Utah Data Centre built to process the massive amounts of data gathered through NSA-programs such as PRISM or UPSTREAM, she unravels the entanglements between big data, dataveillance, local infrastructure, and what she terms the "agential potentialities of water" (1). Hogan points out that the immense water supplies needed to cool down the powerful NSA

⁷ An overview over the documents released by Snowden can be accessed here <http://www.theguardian.com/us-news/the-nsa-files> and here https://en.wikipedia.org/wiki/Global_surveillance_disclosures_%282013%E2%80%93present%29. See also Poitras (2015).

⁸ The material dimensions of the NSA surveillance scandal have attracted artistic responses as well. In his materialist interventions, photographer and activist Trevor Paglen (2014, 2015) has among other things used astronomy-grade photographic lenses to visualise the concrete technical and institutional infrastructure behind the NSA's clandestine activities. With the museum installation *autonomy cube*, to provide another example, he created a free WiFi hotspot as a work of art that not only critically comments on the black-boxing of contemporary technology, but in addition - at a performative level - enables visitors to browse the Internet anonymously using the TOR network and high-end encryption tools.

equipment emerge as a geophysical Achilles's heel of the agency's global surveillance efforts that is targeted in local initiatives fusing political, economic, and environmental concerns in attempts to challenge mass surveillance.

A central, though somewhat underemphasised, element in Hogan's (2015) argument is the concept of agency. Her attention to the role of material components such as technology and water in the activities of the NSA enables a focus beyond human actors when addressing the politics of digital surveillance. Hogan's (2015) study assigns certain agential capacities to both technical objects and the flows of minerals, chemicals and other substances, and shows how these inform and predispose human forms of agency. As such, her approach challenges the often assumed pre-eminence of a liberal humanist subject and aligns to central tenets of theories such as Bennett's (2010, 17-18) "vital materialism" or Parikka's (2015, 14) "medianatures".

This shift in focus toward non-human forms of agency has ethical and theoretical implications. Drawing upon the work of Latour (2005), Coole (2013) has argued that understanding agency as a set of capacities distributed across not only human beings but also animate and even inanimate objects implies an ontology of becoming, where a thinking of constant processes of change and adaptation replaces received understandings of presumably static categories and dichotomies. On this basis, Coole argues for a "capacious historical materialism" (461) as an overarching lens through which global political and socio-economic processes can be connected to meso-level systems and structures as well as to individual embodied lifeworlds. Not unlike Parikka's (2015) criticism of Kittler (1990) or Starosielski's (2015) embedding of digital infrastructures in local settings and dynamics, Coole proposes to trace "material flows across different tiers of the social/natural eco-sphere" and to assess their "feedback loops as they give rise to lived parameters of ordinary lives" (455). In assigning "agential potentiality" to water, Hogan (2015, 1) activates such a notion of non-human agency and productively implements it in her analysis of the politics of NSA surveillance.

Coole's (2013) concept of "distributed agentic capacities" (456) also gains relevance for analysis of the processes, procedures, and technologies that operationalise the vast amount of data assembled by agencies such as the NSA and GCHQ. The acquired data sets are so extensive that they become inaccessible to manual analysis and require machinic forms of assessment to produce actionable information. As a consequence, algorithmic forms of cognition increasingly produce the knowledge base that selectively informs human decision-making cycles (Pötzsch 2015; Nisa 2016). To provide an example, Currier (2016) and Scahill and Greenwald (2016) have shown that even though the U.S. president formally signs off on each strike carried out by U.S. drones, these decisions are based on 'facts' that are often automatically assembled by increasingly autonomous technical systems. Here non-human cognition, despite its flaws and limitations,⁹ narrowly predisposes human deliberation and entails potentially deadly consequences.

The ethical problems associated with this practice are highlighted by Chamayou (2015). In the context of an increased automatisisation and robotisation of contemporary warfare, he warns against an undermining of responsibility and a hollowing out of our understanding of the human from an ontological category to a

⁹ Algorithmic analysis creates actionable information by identifying patterns and correlations, yet remains incapable of perceiving data in context. The method is prone to error due to, among other things, limitations or biases of the employed datasets. See Andrejevic (2013, 19-40), Scahill and Greenwald (2016), or Boyd and Crawford (2012).

mere axiological set of properties readily applicable to non-human agents as well (209). He writes: “The whole problem [with automated target acquisition in drone warfare] – at once epistemological and political – lies in this claimed ability to be able to correctly convert an assembly of probabilistic indices into a legitimate target” (49). In his point of view, algorithmic analytics constitute a poor tool for such potentially deadly, deeply contextual and contingent – and therefore ethically problematic – practices.

A materialist understanding of digital surveillance, however, not only challenges received notions of a primacy of human agency and struggles with the ethical implications of such a move but also enables new perspectives on how human bodies, subjectivities, and intentions are moulded and formed in complex socio-technical systems. Drawing upon the concept of cultural technique (Winthrop-Young 2013), I have elsewhere used the examples of drone warfare and contemporary technologies of border control to highlight the “complex processes through which humans, machines, and the operations interconnecting them mutually frame and constitute one another” (Pötzsch 2015, 102). In addressing both the socio-technical potentials for identification, management and control, and the often messy and unpredictable implementation and negotiation of these potentials at the level of everyday practices, I argue that contemporary cultural techniques of biometrics, dataveillance, and algorithmic analysis “actively shape [...] the contingent bodies, subjectivities, data-doubles, and patterns of life they purport to identify and process” (115). In the cases I have studied (2015), non-human components of complex systems not only hold peculiar agentic capacities but also frame and predispose the formation of human subjectivities and intentions as such questioning apparently neat divisions. Providing a similar argument, Raley (2013) states that algorithmically driven predictive politics makes data “performative” (128). This means that “the composition of flecks and bits of data into a profile of a terror suspect, the re-grounding of abstract data in the targeting of an actual life, will have the effect of producing that life, that body, as a terror suspect” (Ibid.). These constitutive aspects of socio-technical systems entail profound ethical and legal challenges detailed by Chamayou (2015, 208-213) and demand a politically conscientious rethinking of the concept of agency in line with the one proposed by Coole (2013).

As the next section will show, the idea of a mutually constitutive relation between human and non-human components imbricated in emergent socio-technical and biophysical systems retains its relevance for a materialist analysis of the politics and practices of counter-surveillance in digital networks.

3.2. Distributed Leaking: The Agency of Networks in Counter-Surveillance

Since 2010, the activist whistleblower site WikiLeaks has published millions of classified digital documents ranging from briefs by U.S. soldiers in Afghanistan and Iraq, via files related to the Guantanamo prison and secret no-fly lists, to U.S. diplomatic cables and emails connected to the leadership of the Democratic Party in the U.S.¹⁰ In its operations, WikiLeaks relies upon the same material infrastructure that is exploited by the NSA and other agencies to survey global communication flows. This time, however, these technologies afford the acquisition, storage, indexing, and distribution of secret government documents (Assange 2015). While

¹⁰ An overview over all accessible documents is available here: <https://WikiLeaks.org/-Leaks-.html>. The diplomatic cables can be accessed via the indexed and searchable Public Library of US Diplomacy (PlusD) at <https://WikiLeaks.org/plusd/>. See Harrison (2015).

early leaks were carefully assessed and redacted by teams of journalists enlisted by WikiLeaks to verify documents and avoid unintended blow-backs, later revelations were, at times unintentionally, dumped on publicly accessible sites causing problems for verification and consequence assessments, and opening up the problem of fake leaks and political instrumentalisation (Greenwald and Klein 2016; Gallagher 2016).

The materialist lenses introduced in the present article can provide valuable insights into the socio-technical dynamics of the WikiLeaks affair. The vantage point of technology, for instance, can highlight the concrete instruments that enable practices of distributed leaking such as the TOR network or publicly available encryption tools, explain their functioning and affordances, and address possible pitfalls and countermeasures. The perspective of political economy, to provide a second example, enables a better understanding of the multiple responses to the operations of the whistleblower site.

Zajácz (2013) has detailed how economy and technology factor into U.S. government countermeasures against WikiLeaks. The various initiatives taken by U.S. authorities blended public and private actors and, besides taking legal steps, also appropriated 'grey' technologies such as DDOS attacks to bring down servers hosting WikiLeaks. These multi-level assaults targeted the site's material "real-word underpinnings" (498) – its economic means of subsistence, technological base, and support network – by forcing ISPs, credit card companies, and banks to cancel services and return funds.¹¹ Gallagher (2016) and Greenwald and Klein (2016) on the other hand have highlighted how the content of recent unfiltered dumps, such as the Podesta emails, might have been amplified and even tampered with by political actors with a vested interest in the outcome of the U.S. election, in this way reiterating established concerns regarding the emergence of a "post-truth politics" (Andrejevic 2013, 11).

The cases above highlight the importance of material perspectives that look to issues of practical (re-)appropriations of technology, ownership, and political as well as economic control when explaining the politics of contemporary digital networks. At closer inspection, however, it becomes apparent that, comparably to the NSA dataveillance scandal treated earlier, the case of WikiLeaks cannot be sufficiently understood without looking beyond the confinements of economic, political, and technological perspectives.

In public discourse, both contenders and defenders of WikiLeaks have directed considerable attention to the person of WikiLeaks founder Julian Assange who has either been condemned as digital-era villain *par excellence* or hailed as tech-savvy champion of press and information freedom. Žižek (2011), Giri (2010), and Castronovo (2013) have challenged this embedding of the WikiLeaks disclosures in received narratives of liberal subjects confronting overarching structures of dominance. Žižek (2011, 9), for instance, states that in the conception of liberal defenders of WikiLeaks, "power is held by the bad guys at the top, and is not conceived as something that permeates the entire social body", while Giri (2010, n.p.) notes that "WikiLeaks cannot be contained and even understood as part of an impeccable liberal idea of an active citizenry, transparency, accountability". Both critiques allow for a productive questioning of underlying notions of agency structuring dominant responses to the WikiLeaks affair.

¹¹ In response to these attacks on WikiLeaks the anarchic network Anonymous launched similar assaults on the websites of involved companies and state agencies (see Fuchs 2015).

Recalibrating the debate from a materialist viewpoint, Castronovo (2013) has interrogated the dynamics of the socio-technical networks in which the WikiLeaks affair has played out. He argues that, in the case of WikiLeaks, “what matters are the pathways for getting at content and then spreading it”. As such, “the network mode of spilling secrets – more than the secrets themselves – carries insurgent potential” (434). In this understanding, the radicalism of WikiLeaks lies not only in the content of the documents the whistleblower site discloses, nor does it exclusively reside in the agency of particular individuals. Rather, a peculiar agency of networks needs to be conceptualised that is irreducible to the wilful actions of subjects such as Assange or the NSA.

Castronovo’s view enables a questioning of the concept of the liberal humanist subject in general and human forms of agency in particular. Assange, WikiLeaks, the U.S. government, banks, hackers, and ISPs become conceivable as mere subunits with certain ‘agentic capacities’ that operate alongside computational devices, fibre-optic cables, flows of energy and substances, codes, protocols, and so on. These multiple human and non-human actors are at once constituted by, and constitutive of, the emergent socio-technical systems and practices they are imbricated in. Political subjectivity and activity changes in encounters with complex networks and their ambivalent affordances.

Castronovo’s (2013) perspective retains a certain autonomy of human actors, but limits it with respect to other forms of agency. As such, even though his approach challenges received notions of power and sovereignty at a fundamental level, a reductive technological determinism is avoided. In a similar vein, Coole (2013, 460-461) proposes a scalar model that distinguishes stronger from weaker forms of agency to avoid a politically debilitating reduction of politics to socio-technical determinants. According to her, weak agency is characterised by its efficacies alone, while stronger forms are able to strategically adapt behaviour in accordance with normative assumption about a preferred state of affairs. While the agentic capacities of inanimate objects are predominantly characterised by their systemic effects and, in an advanced form, by their ability to adapt behaviour through algorithms and feedback loops, human agency is inherently (self-)reflective and capable of conscious deliberation. Therefore, human actors can be held responsible in relation to contingent normative frameworks in a way machines cannot even though these are programmed with recourse to the most advanced legal and ethical frameworks, since these with necessity always will be partial, contingent, and emergent over time. Coole’s (2013) conceptual move re-enables critical perspectives and re-asserts the possibility of politics and accountability, while maintaining attentiveness to a multiplicity of constrained agentic capacities in material and materialising socio-technical systems.¹²

In this view, the actions taken by, for instance, WikiLeaks or the U.S. government can be seen as embedded in, and predisposed by, complex networks combining both human and non-human components in constantly emerging ecologies that, through their processual nature, undermine ascertained static identities and categories. At the

¹² Coole’s (2013) scaling of agencies might be read as a tacit re-introduction of a privileged human subject. However, I would argue that her re-assertion of a possibility of politics is not an ontological move, but a pragmatic one directed at inherently contingent human-made, normative frameworks. In addition, as Coole and Frost (2010) explain, new materialism’s questioning of a pre-eminence of human subjects enables a new form of politics that challenges the “Promethean idea of human mastery over nature” (17) and facilitates a non-instrumental and non-exploitative relation of humans to the environment.

same time, however, due to the reflectiveness of specifically human forms of agency that actively engage with, and negotiate constraints in relation to, contingent normative frames, political and juridical responsibilities can be brought back into the analysis. Through this materialist outlook, the debate concerning WikiLeaks is re-located to the level of human deliberation and politics, while the relevance of non-human actors and machinic forms of agency and cognition is explicitly acknowledged and made relevant. By these means, to return to Casemajor (2015, 10), the “political dimension of digital materialism” can be addressed “frontally”.

4. Utopia, Dystopia, Myopia: A Conclusion

As Thacker (2004) has pointed out, “[u]nderstanding networks not as metaphors, but as materialized and materializing media, is an important step toward diversifying and complexifying our understanding of power relationships” (xv) in contemporary societies. The present article has introduced four lenses inviting such critical materialist diversifications and complexifications of media and communication research – technology, economy and labour, the body, and ecology – and has argued that these can help open up new areas for investigation and highlight previously understudied aspects of contemporary techno-politics.

Another objective has been to challenge what appears as an inherent myopia of utopian and dystopian discourses about contemporary technological developments. Such discourses tend to posit digital networks as either inherently liberating or as unprecedented tools for oppression, exploitation, and control. Avoiding such “one-eyed visions” (Kline, Dyer-Witford and de Peuter 2003, 18), the present contribution has argued for the usefulness of a materialist lens to bring forth the ambiguous affordances and ambivalent effects of digital technologies, and pointed to dialectical and mutually constitutive, rather than deterministic, relations between humans and their socio-technical environments.

The four materialist lenses proposed above have the advantage of enabling focused piecemeal approaches to specific phenomena. However, this division is also prone to a peculiar four-eyed myopia; in treating each perspective in isolation, one risks losing sight of their interdependences. Consequently, a third objective of this paper has been to highlight interrelations between the four fields and to see concrete technologies, economic conditions and relations of production, biophysical bodies, and environmental implications as constitutively intertwined. Rather than perceiving contemporary network technologies as either controllable tools or controlling systems (Nardi and O’Day 1999, 27), such a re-integrated view makes them conceivable as “complex material formations that operate at multiple scales” (Parks and Starosielski 2015, 7) combining global processes, meso-level structures, and individual practices and lifeworlds.

This bringing-into-view of the manifold connections and mutual dependencies between the four materialist subfields enables a critical re-thinking of the relations between human and non-human actors. As a consequence, a last objective has been to problematise the often-assumed primacy of a liberal humanist subject and investigate the distribution of agentic capacities across a variety of animate and inanimate objects interconnected in digital networks. The idea, however, was not to eradicate a possibility of politics with reference to determinate socio-technical structures, but, following Coole (2013), to re-assign human actors a peculiar form of agency that, even though framed and predisposed by technical systems, still retains the capacity of (self-)reflection and that, therefore, can be held accountable in relation to ultimately contingent, man-made and evolving, normative frames. A

subsequent analysis of the cases of NSA surveillance and WikiLeaks served to illustrate some of the benefits of these conceptual moves.

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