Security that matters: critical infrastructure and objects of protection

Abstract

Critical infrastructure protection is prominently concerned with objects that appear as indispensable for the functioning of social and political life. However, the analysis of material objects in discussions of critical infrastructure protection has remained largely within the remit of managerial responses, which see matter as simply passive, a blank slate. In security studies, critical approaches have focused on social and cultural values, forms of life, technologies of risk or structures of neoliberal globalization. This article engages with the role of 'things' or of materiality for theories of securitization. Drawing on the materialist feminism of Karen Barad, it shows how critical infrastructure in Europe is neither an empty receptacle of discourse nor does it have 'essential' characteristics, but emerges out of material-discursive practices. Understanding the securitization of critical infrastructure protection as a process of materialization allows for a reconceptualization of how security matters and its effects.

Keywords
materiality, securitization, critical infrastructure protection, discourse, performativity, agency

Introduction

'The potential for catastrophic terrorist attacks that affect critical infrastructures is increasing' (European Commission 2007). Thus describes the threat of terrorism a European Commission Communication on Critical Infrastructure Protection in the fight against terrorism. Critical infrastructures have emerged as an increasingly important priority in counter-terrorism activities after 9/11 in Europe. The European Commission lists the protection of infrastructures alongside the protection of borders and that of citizens. Unlike the protection of citizens, critical infrastructure is mainly concerned with physical and cyber-based systems; things and their material connectivities have become instrumental in the understanding of what it means to secure societies against terrorist attacks and other risks and hazards. Although critical infrastructure is generally considered a new coinage that goes back to US developments in the mid-90s, post-9/11 there have been innumerable documents on the vulnerabilities and protection of critical infrastructure from international organizations, governments, and research institutions. These largely concur in the definition of critical infrastructure as predominantly about the role of things in society, their functioning as well as their resilience. Material objects appear to support the provision of services, societal cohesion and the reproduction of national identity. Questions of critical infrastructure protection have given prominence to

the role of things – from computers to transport and energy infrastructure to the daily TV set so that security scholars acknowledge that 'the (core) rationality of CIP is associated with physical objects' (Dunn Cavelty and Kristensen 2008: 11).

However, the importance of materiality in discussions of critical infrastructure protection has largely remained within the remit of managerial responses. These ask for the invention of modalities of protection to safeguard pre-existing things and their functionalities. In critical analyses of the protection of critical infrastructure, materiality is supplanted by social, cultural and political discourses and practices. Even when its materiality is acknowledged, critical infrastructure protection is nonetheless ultimately about social and political action and human life (see for example Lipschutz 2008). Or it appears to be subsumed under the semiotics of the virtual, thus displacing both the material of physical infrastructure and that of virtual infrastructure (Der Derian and Finkelstein 2008). As the main purpose of CIP is to ensure that critical operations can continue without 'undue interruption and that crucial, sensitive data are protected' (GAO), security experts have focused on the measures and technologies deployed to ensure the robustness and resilience of critical infrastructure. These initiatives to protect infrastructure from catastrophic breakdowns obliterate a series of other practices and their constitutive role in the functioning or disruption of critical infrastructures. Mark Salter has argued, for example, that thinking of airports as a series of technical, managerial, bureaucratic and regulatory problems left out questions of market, the state and society (Salter 2008: 22). How is materiality to be understood between these two poles: one of technical positivity and the other of social practices of governance? Critical infrastructure is not just the result of a complex assemblage of social practices and values (Burgess 2007) – although this is not to say that social and cultural practices do not play a crucial role – but it emerges as an object whose materiality has both enabling and constraining effects on what can be said and done to secure it. The protection of critical infrastructure enacts particular distinctions between infrastructure and society, 'hard' things and 'soft' relations, human and non-human, matter and meaning. In this materialization of what is to be made secure, infrastructure plays an agential role, both constraining and enabling of particular configurations.

This article engages with the role of materiality for theories of securitization to support this insight. Securitization has been seen as largely part of the linguistic and social constructivist turn in international relations. Risk, security, disaster and war have been unpacked as discursive and institutional practices that constitute both that which is to be secured and the threat to be eliminated or neutralized. As a performative and intersubjective practice, securitization has largely ignored the role of 'things' in the articulation of insecurities. The subjects of security have been generally humans – be those more or less reified in particular communities, such as nations, states or regions. The referent objects of security have been particular social constructs: identities, cultural values, 'ways of life' and so on. Although analyses of security and risk have incorporated discussions of technologies and institutions, non-human objects have been relegated outside the realm of securitization, either as simply 'facilitating' conditions for securitization (Buzan, Waever, and de Wilde 1998) or as remnants of mainstream positivism. Even the literature drawing on Foucault's notion of the *dispositif* has been less interested in the role that objects played in the definition of the security *dispositif* (Aradau and van Munster 2007, 2008; Dillon 2008; Dillon and Lobo-Guerrero 2008;

Lobo-Guerrero 2007). Discussions of rationalities, technologies and subjectivities in the governance of security did not lead to an engagement with the role of 'things' in security constructions. If the social is seen as the sphere of intersubjective relations, then objects can only have marginal and highly ambiguous status.

Rather than relegating materiality to the margins of the social world or including them as mere passive receptacles of human action, other approaches in social sciences have for some time now tried to reconceptualize the role and agency of objects in the production of reality. Some has spoken of a 'material turn' in contradiction to 'cultural' or 'linguistic turns'. However, the discourse of 'turns' can obscure the genealogy of materiality in social science. As Susan Hekman (2009) has astutely noted in a reprise of Latour's diagnostic that 'We have never been modern', when it comes to materiality 'We have never been postmodern'.[1] Materiality has been at the heart of feminist analyses of embodiment (Butler 1993), historical materialist analyses of labour (Ebert 2005), geographies of nature (Bennett 2004), anthropologies of commodities (Appadurai 1988) and ethnographies of scientific practices (Latour 1996a). It has also been theorized in critical engagements with the production of insecurity within global political systems of imperialism and neoliberal capitalism (Agathangelou and Ling 2004; Neocleous 2008) and its effects on the materialisation of bodies (Hansen 2000). However, the materiality of 'non-human things' and its relation to other discursive and material practices have been by and large absent. Martin Coward's (2006) suggestion to move away from anthropocentric analyses of violence by considering urbicide or the destruction of the built environment as a distinct form of violence has been an exception, drawing attention to the need to take inanimate objects seriously.

Drawing on the materialist feminism of Karen Barad, I propose to consider materiality as co-constitutive of reality (rather than as a distinct form as Coward intimates). 'Things' are neither empty receptacles of discourses nor do they have 'essential' characteristics that set them apart from humans, but are themselves agential and emerge in relation with material-discursive practices. Barad's work is thus doubly apt to help in such a reconceptualization: on the one hand, she shows how distinctions between the natural and the social, objects and subjects are not pre-given, but are materially and discursively produced; one the other, Barad develops conceptual tools which have been instrumental for analyses of insecurity. Barad reformulates Butler's analysis of performativity and Foucault's analysis of the dispositif or apparatus. In this light, securitization needs to be understood as a process of materialization which enact a reconfiguration of the world in ways in which differences come to matter. To illustrate how securitization materializes a particular reconfiguration of the world, I explore the materialization of critical infrastructure as an object of protection against terrorist attacks.

To this purpose, the article is set out in three stages. First, I discuss Barad's conceptual framework and situate it in relation to other debates about materiality. Second, I explore the analytical debates about the securitization of infrastructure. Third, I consider how the materialisation of critical infrastructure as an object of protection enacts a reconfiguration of the world and how the production of (in)security depends on material-

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[1] Susan Hekman (2009) has recently argued in favour of a Foucauldian position that considers both discourse and power against Latour's charge of 'linguistic postmodernism'. However, the emphasis remains on bodies rather than on the form of the materiality and dynamic intra-action that Barad analyses.

discursive practice through which particular materialities emerge as more important than others.

Reconceptualizing materiality

Debates about materiality are not new. Different strands of materialist approaches go back to Epicurus, Hobbes, Spinoza or Marx. For Marxist debates, materialities were understood in terms of fetishization and reification, in which the subject-object relation functioned through its reformulation and instability (Pels, Hetherington, and Vandenberghe 2002). Marx's 'commodity fetishism' and 'reification of human relations' express particular transformations in capitalism. Human relations appear as relations as mediated through commodity exchange appear as relations between things. Anthropologists have qualified the 'commodity fetishism' either by analyzing different forms of fetishization in non-industrial societies or by expanding the circuit of objects beyond that of the circulation of commodities. Arjun Appadurai (1988) has coined the term 'the social life of things' to refer to objects that do not only have a social life, but they have a 'life' in themselves and enter within many types of relations with the social. From gifts to commodities and the other way round or from sources of inequality to protection against crisis, there are numerous ways in which objects 'act' in the social world. In cultural geography for example, the rematerialising turn is formulated against the preoccupation with cultural processes, with the constitution of intersubjective meaning systems, with the play of identity politics through the less-than-tangible, often-fleeting spaces of texts, signs, symbols, psyches, desires, fears and imaginings (Philo 2000: 33).

Cultural geographers have already tackled the supposed distinction between inanimate objects (gardens, urban landscapes, etc.) and agential humanity (Anderson and Tolia-Kelly 2004). If in social sciences, things have generally been derivative from social and human interactions, the so-called 'material turn' sees both things and humans as co-present in the social world and are involved in the constitution of social order. As Jane Bennett (2004: 455) has put it, '[s]tructures, surroundings, contexts, and environments name background settings rather than spirited actants'. In sociology, the emphasis on human actors has also shifted towards networks of actants (Latour 1996a, 2005). Drawing on Latour's theory, Graham and Thrift (2007: 3) have argued that '[t]hings are not just formed matter, they are transductions with many conditions of possibility and their own forms of intentionality'.[2] For Latour and actor network theory, we can only reinject 'things' in our understanding of the social fabric by having a network-like ontology (Latour 1996b, 2000). Things and artifacts need to be seen as social entities that play an active part in the generation, stabilization, and reproduction of social order and sociality (Preda 1999: 349).

The role of things as artifacts in cultural geography, sociology and anthropology has, however, opened a field of contestation. Analyses of materiality can be based on varied and sometimes contradictory ontological and epistemological commitments (Bakker and Bridge 2006). Materiality can be used in a sense reminiscent of a positivist ontology, as in many expert reports on critical infrastructure protection. 'Not all

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[2] The 'materialist' literature in human and cultural geography includes, among others, (Anderson and Tolia-Kelly 2004; Braun 2005; Castree 2003; Jackson 2000; Lees 2002; Whatmore 2006).

infrastructures can be protected from all threats. For example, electricity transmission networks are too large to fence or guard', notes a European Commission Communication (European Commission 2004). It can also be used in ways that emphasize the reification of the social world: 'things' give stability to the social world and 'contribute to generating temporality structures that ensure the coherence and stability of social order' (Preda 1999: 355). Thus, materiality often risks being folded back upon either static physicality or social conditions. By consequence language is seen as establishing a relation of adequacy with these 'foundations' or 'conditions'. Representation is privileged at the expense of performativity. To quote again the European Commission Communication, the criteria for identifying potential critical infrastructure are 'the extent of the geographical area which could be affected, magnitude and effects with respect to time' (European Commission 2004). However, other approaches to materiality see it as agential, as co-constitutive of the social world and in movement or transformation (Barad 2007; Bennett 2004, 2010; Latour 2005; Miller 1998). This point of agreement does not efface the many points of contention between these approaches too.

Karen Barad's materialist feminism is of particular interest for rethinking 'matters of security' as she engages with two of the conceptual frameworks that have inspired many of the debates around securitization: on the one hand, Judith Butler's performative theory of speech acts (Buzan, Waever, and de Wilde 1998; Hansen 2000; McDonald 2008; Stritzel 2007) and on the other, Michel Foucault's analyses of power/knowledge and the *dispositif* of security (Aradau and van Munster 2007, 2008; Dillon and Lobo-Guerrero 2008; Huysmans 2006). Barad draws attention to the theorization of materiality in both Butler and Foucault, but reconfigures some of their analyses by offering conceptual tools to understand the *relation* between matter and meaning rather that the fact they both matter. Unlike the feminist literature which has considered materiality particularly in relation to the human body, Barad extends the conceptualization of materiality to non-human objects. She starts her seminal article on posthumanist performativity with a brief sentence: 'Language has been granted too much power'. In contra-distinction to linguistic understandings of performativity, Barad proposes an account of posthumanist perfomativity which incorporates important material and discursive, social and scientific, human and nonhuman, and natural and cultural factors (Barad 2003).[3] Barad's reformulations of performativity and materiality differ from Latour and ANT as she places it within feminist, postcolonial and poststructuralist debates. She points out that the use of performativity with ANT theory is evacuated of its political history, particularly in relation to the political role that performativity plays in feminist and poststructuralist theories (Barad 2007: 410-411 ft. 18).[4] Thus, Barad's concern with agency and matter as materialization leads her to consider not only the working of 'nonhuman forces' but also the productive working of geopolitics, economics and history as theorized by feminist and postcolonial scholars.

Although both Butler and Foucault take into account the materiality of the body and its materialization through regulative practices, Barad argues that they both fail to provide an account of *how* both materiality and language matter. For Butler, the body

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[3] Barad's criticism of the emphasis on language has not been spared criticism. For an exchange on the role of materialism in feminist research, see Sarah Ahmed (2008) and Davis (2009).
[4] ANT has been criticized for doing away with normative and critical theory by both feminist and science scholars.

emerges through iterative performative processes. Materialization does not need an external referent as it is produced through regulatory norms. Yet, contra Butler, Barad contends that 'materialization is not only a matter of how discourse comes to matter but also how matter comes to matter' (Barad 1998: 108). Although Butler's account of matter as a process of materialization renders matter as 'ongoing historicity' (Barad 2007: 151) rather than as a passive, blank slate, she ultimately reinscribes matter as the passive product of discursive practices.

Foucault, on the other hand, considers the materialization of human bodies through complex forms of power/knowledge. Nonetheless, despite an understanding of power/knowledge and of discourse as material, he ultimately takes for granted the material character of objects. His definition of a *dispositif* of power is revealing in this sense: a *'*thoroughly heterogeneous ensemble consisting of discourses, institutions, architectural forms, regulatory decisions, laws, administrative measures, scientific statements, philosophical, moral and philanthropic propositions–in short, the said as much as the unsaid' (Foucault 1980). Similarly, discussions of disciplinary power assume a given materiality of the prison that is not agential, but is subsumed to particular types of human action. Barad's point may be however unduly harsh – although Foucault does not consider the co-constitutiveness of materiality and language, there are numerous points in which he analyses the role of materiality both as constituted and as constitutive of subjectivity and a particular discourse around reforming prison inmates. Suffice to think of the partition of space in prisons.

However, even if one needs to qualify some of Barad's reading of Foucault, her astute point is also that one needs to call into question 'the givenness of the differential categories of 'human' and 'nonhuman', examining the practices through which these differential boundaries are stabilized and destabilized' (Barad 2007: 66). The main critique against a Foucauldian approach to the *dispositif* or apparatus of power/knowledge it that it failed to theorize the relationship between discursive and non-discursive practices. Thus, matter cannot be simply thought as an end product of discourse. Bodies are not simply 'made', materialized through discourse. Security does not become 'material' through the simple imbrication of rationalities and particular technologies. Rather, Barad cautions, matter is also an active factor in material-discursive processes. She proposes an agential realist ontology that rejects the distinction between words and things and postulates the existence of relata among which social relations mediate. Matter and meaning are mutually articulated and neither can be reducible to the other or explained in terms of the other (Barad 2007: 152).

Barad shows that not only are boundaries and objects not pre-given, but matter is an open-ended practice, the historical effect of iterative materializations. The question is which specific material practices matter and how they come to matter (Barad 2007). Matter is generative and agentive not just in the sense of bringing new things into the world, but also in the sense of bringing forth new worlds (Barad 2007: 170). Subject and object, matter and meaning do not exist separately and do not come to inter-act, but are both formed and transformed through intra-action. Intra-action is one of the key terms in Barad's reconceptualization of performativity. It signifies the '*mutual constitution of entangled agencies'* (Barad 2007: 33) and is opposed to interaction, which assumes pre-existing agencies. Intra-action is an open-ended practice involving dynamic entanglements of humans and non-humans, though which these acquire their specific

boundaries and properties. According to Niels Bohr's quantum model of the atom which has inspired Barad's agential realism approach, things do not have inherent determinate boundaries or properties. Boundaries are drawn and distinctions are made through intra-active entanglements. Matter therefore is not the end product of discursive practices, the effect of performative speech acts or of power/knowledge, but is implicated in processes of materialization. The newly coined 'posthumanist performativity' refers to the ways in which matter is part of 'dynamic topological reconfigurings/entanglements/relationalities/(re)articulations' (Barad 2007: 141)). Matter is agential as it enters into a permanent and historical reconfiguration of the world. Thus, for Barad,

> Matter is neither fixed and given nor the mere end result of different processes. Matter is produced and productive, generated and generative. Matter is agentive, not a fixed essence or property of things. Mattering is *differentiation, and which differences come to matter, matter in the iterative production of different differences (Barad 2007: 137 emphasis mine)*.

Barad's conceptual framework has been used to understand the materiality of the body by several feminist scholars (Colls 2007; Fraser and Valentine 2006). However, inanimate objects have been by and large missing from these analyses. For the purposes of this article, I take Barad's own work on the piezoelectric crystal as a transducer in obstetric sonography to be particularly useful. In the article (reprinted as a chapter in her book, *Meeting the Universe Halfway)*, Barad uses the piezoelectric crystal as a tool to explore the relationship between the material and the discursive more generally (Barad 1998). Her argument is about the object of the piezoelectric transducer is important for a reconsideration of the materiality of security and of critical infrastructure protection as undertaken in the next two sections. The piezoelectric transducer as an apparatus enact 'agential cuts that produce determinate boundaries and properties of 'entities' within phenomena . . . *Hence apparatuses are boundary-making practices*" (Barad 2007: 148 emphasis in original). As in the laboratory, apparatuses of measurement are themselves not given or passive – rather, one of the difficult tasks for science is getting the instruments to work in a particular way for a particular purpose (Barad 1998: 102).

While ultrasound images are now taken for granted in obstetrics and have become normalized everyday practices for visualising fetuses (e.g. Mitchell 2001), Barad points out how they have been made possible by the piezoelectric transducer. The transducer is the machine interface to the human body (Barad 1998: 101). The sound waves received from the human body reach the transducer, they are converted into electric signals which can be visually displayed. The sonogram images which appear on the computer screen are the result of the intra-action between the transducer (the apparatus) and the 'fetus' (the object). Transducers also materialize in relation ot particular acoustic impendances and resonant frequences. Producing a good picture of a fetus, Barad (2007) points out, is not that simple. The transducer is not simply a 'thing', an apparatus of measurement, as the fetus is not simply a 'body'. Both are dynamically produced through intra-action and are open to rearticulation and reshaping. The fetus becomes knowable because of the ultrasound technology which has materialized it. This recognition is derived from Bohr's

recognition that the nature of light (waves or particles) depends on the apparatus used for its observation (Barad 1998: 90).

The materiality of the transducer is not given but is constituted by a series of other practices: medical, legal, educational, architectural, military etc. Different forms of knowledge (technological, medical) are also implicated in the materialization of the transducer. Piezoelectric transducers, Barad argues, materialize in relation to a whole series of material-discursive practices such as medical needs, design constraints, market factors, political issues, educational background of engineers etc. This rendering of materiality is particularly close to Foucault notion's of dispositif and his analysis of the materialization of bodies. Nonetheless, Barad (1998; 2007) argues that Foucault's analysis of non-human bodies is not cognisant of their materiality in the same way.

Objects do not pre-exist, but are constituted through intra-action between different material-discursive practices. Although derived from a military technology, the ultrasound apparatus is not simply a means of surveillance, but is continually transformed in relation to material-discursive practices. The improvement of image resolution encouraged both practitioners and patients to focus exclusively on the image of the fetus which fills the whole screen (Barad 1998: 110). Such material rearrangements function in intra-action with political and medical discourses about the autonomy and subjectivity of the fetus. The fetus itself is constituted through material-discursive practices of bodily production. The autonomy and separation of the fetus is the result of practices that deny the intra-action between the maternal body, the fetus, and other apparatuses. The fetus is materialized as a free-floating, separate body within a maternal 'environment'.

These practices draw boundaries and enact exclusions by creating materialities which matter more than others. In this process, the piezoelectric transducer is a 'prosthetic device for making and bridging boundaries' (Barad 1998: 100). Thus, the emphasis on the materiality of the fetus at the expense of the materiality of the maternal body redefines questions of accountability, while also overlooking the particular conditions of material-discursive practices which make these identifications possible. By reconfiguring the world and redrawing borders between what 'matters' and what doesn't, between the human and the non-human, material-discursive practices are intimately entwined with power relations. Barad notes that the 'epidemics of infertility' thought to affect mostly middle-class white women obliterates the infertility caused by environmental racism. Barad's posthumanist performativity can be instrumental not just in analysing the intra-actions between matter and meaning in processes of securitization, but their effects as boundary-making practices.

Securitizing infrastructure

The securitization of critical infrastructure is pre-eminently about the protection of objects. Critical infrastructure protection is generally held to have emerged as a security issue in the mid-1990s and the terminology of 'critical infrastructure' itself to have been coined by Clinton administration in 1996. Critical infrastructure allegedly signifies a difference from earlier usages of 'infrastructure'. While infrastructure was part of military strategy to weaken the enemy, its transformation into a matter of national security has been variously located either during the Cold War (Collier and Lakoff 2007) or after 9/11 (Center for History and New Media 2009). If military strategy could also

involve the destruction of one's own infrastructure, the securitization of critical infrastructure assumes an understanding of infrastructure as foundational. Societies are 'grounded' in infrastructure, their functioning, continuity and survival are made possible by the protection of infrastructure. A 1997 report by the Commission on Critical Infrastructure Protection was symbolically entitled 'Critical Foundations' (Commission for Critical Infrastructure Protection 1997). Definitions of critical infrastructure list heterogeneous elements, from communications, emergency services, energy, finance, food, government, health, to transport and water sectors (Centre for the Protection of National Infrastructure (CPNI) 2009). The general argument about the necessity to protect critical infrastructure is framed along these lines (with little variation from a report to another and from an author to another):

> Our modern society and day to day activities are dependent on networks of critical infrastructure – both physical networks such as energy and transportation systems and virtual networks such as the Internet. If terrorists attack a piece of critical infrastructure, they will disrupt our standard of living and cause significant physical, psychological, and financial damage to our nation (Bennett 2007: 9).

The UK's Centre for the Protection of National Infrastructure defines the effects of any failure in national infrastructure to lead to 'severe economic damage, grave social disruption, or even large scale loss of life' (Centre for the Protection of National Infrastructure (CPNI) 2009).

Naming infrastructures as critical for the purposes of protecting them against terrorist attacks is a securitising move. Where critical infrastructure experts would look for the adequacy of representation to the reality of objects threatened – by drawing up lists of critical infrastructure as a result of risk assessment scenarios – a performative approach would consider the constitution of reality through the iterative speech acts that securitize infrastructure by naming as 'critical' and in need of protection against potential terrorist attacks and/or other hazards. The Centre for the Protection of Critical Infrastructure in the UK encapsulates this double move:

> The most significant threat facing the UK comes from international terrorism and its stated ambitions to mount 'high impact' attacks that combine mass casualties with substantial disruption to key services such as energy, transport and communications. This is a threat that is different in scale and intent to any that the UK has faced before (Centre for the Protection of National Infrastructure (CPNI) 2010b).

Yet, for the Copenhagen School of security studies for example, objects are also relegated to the status of external conditions of speech acts. Objects that are generally held to be threatening (for example, tanks or polluted waters) play a facilitating role in the process of securitization (Buzan, Waever, and de Wilde 1998: 33). Energy blackouts, transport failures and so on could also be read as facilitating conditions of the speech act. In this approach, there is ontological and epistemological ambiguity about the role of objects: as they outside speech acts or the result of speech acts? As the next section will show, this approach cannot account for different materializations of critical infrastructure

– the matter of critical infrastructure is not constant and given but varies depending on the agential cuts created.

The Foucault-inspired literature on the biopolitics of security and risk has also paid scant attention to the materiality of infrastructures. For Dillon and Lobo-Guerrero, for example, biopolitics takes 'species life as its referent object, and the securing of species life becomes the vocation of a novel and emerging set of discursive formations of power/knowledge' (Dillon and Lobo-Guerrero 2008: 267). While they show how a dispositif of security is dependent upon the development of life sciences and they locate historical transformations of biopolitics given the changes in scientific knowledge about the nature of living *material* (Dillon and Lobo-Guerrero 2008: 273)*, materiality as such is not discussed. The things in the security *dispositif* are relegated to the margins of analysis. As noted previously, a *dispositif* is a thoroughly heterogeneous ensemble consisting of the said as much as the unsaid, 'things' are relegated to the margins of analysis and the focus of analysis is shifted upon institutions, economic and social processes, systems of norms, techniques, types of classification, modes of characterization (Foucault 2002: 49). Critical infrastructure protection as a *dispositif* would similarly bring together a heterogeneous array of discourses about terrorism, natural disasters, protection, risk management, security institutions alongside architecture, design, and construction experts, new regulations and laws, administrative measures, scientific knowledge about materials, and moral propositions about 'objects of protection'. As a methodological and epistemological tool, the *dispositif* could shed light on how critical infrastructure protection emerges as a heterogeneous construction. At the same, critical infrastructure is, in a sense, subsumed to the logic of circulatory practices. The securitization of critical infrastructure is ultimately deriving from the practices that separate good from bad circulations and the associated forms of life. This it remains unclear how the materiality of infrastructure is both generative and generated in Barad's terms.

Even when focusing on the rationalities and technologies that make-up particular *dispositifs* of security, materialities of nonhuman objects are not explicitly theorized (e.g. Aradau and van Munster 2007; Huysmans 2006; Lippert and O'Connor 2003). Although the *dispositif* has *material* effects of forming risk groups, dividing the population and placing groups 'at risk' under surveillance or treatment (Dean 1999; Rose 1999), matter is univocally given. The effects of risk management appear to have little to do with how infrastructure is built, rebuilt, retrofitted, how materials are selected, their fluidity, stability or fixity, their forms of agency and the differential reconfigurations of the world that are created through intra-actions with other material-discursive practices. As Barad reminds us, matter is not univocal. As light can behave as both a wave and a particle depending on the experimental and laboratory set-up, critical infrastructure is materialized in different ways, depending on how rationalities and technologies of risk management intra-act with other social and political practices, discourses, forms of knowledge, and materialities.

Moreover, these approaches can also be read to suggest a 'periodization' approach to security. Many of the Foucault-inspired analyses of security have argued for a shift from territory to population, from national to human security and from threats to risk. Recently, Stephen Collier and Andrew Lakoff have located another shift in the *dispositifs* of security: from population to vital systems. Vital systems security is, according to them,

a response triggered by extreme emergencies. Although infrastructure had been an element of military strategy from the 19th and 20th century on, 'total war' and civil defence during the Cold War shifted this understanding towards system-vulnerability. Over the 1960s and 1970s, Collier and Lakoff (2007) argue, techniques for analysing system vulnerability were gradually generalized in the USA. Vital systems became a national security concern in their own right. While the logic was derived from that of strategic bombing, threats are new non-deterrable ones – 'threats without enemies' such as technological failures and natural disasters (Collier and Lakoff 2007). Despite the shift that they locate from population to vital systems as referent objects of security, Collier and Lakoff do not consider the role of materiality in constructions of national security. Materiality appears only in a particular periodization of security starting with the Cold War rather than as matter in intra-action. Thus, the heterogeneous ways in which infrastructure (and critical infrastructure) becomes materialized is lost. As the next section will show, a particular materialization of infrastructure emerges in intra-action with material-discursive practices about the 'foundations' of society, spread of bio-threats, preparedness measures, medical knowledge, design and engineering expertise, police and military expertise as well as nodes, flows, soils, building materials, etc. Yet, this materialization is also a historical process, which intra-acts with other materializations.

In this sense, genealogies of infrastructure are important methodological and epistemological tools to make sense of how critical infrastructure becomes materialized. Although it is beyond the scope of this paper to undertake a genealogy of (critical) infrastructure, a brief overview of the historicity of infrastructure is helpful to see an indication of the missing elements. Not only is 'critical infrastructure' a relatively recent coinage, infrastructure also only came in use in the 1950s. The Times Digital archive starting in 1785 only locates the use of infrastructure in 1950 in an article on 'Western Defence Contribution' (The Times 12 July 1950). £3million is allocated to new projects which are named 'infrastructure projects'. The quotation marks that are used in the article around 'infrastructure projects' and 'infrastructure programme' are indicative of the novelty of the term. In the 1950s 'infrastructure' is directly connected with military operations: it 'covers the basic equipment needed for the whole area to allow N.A.T.O., as distinct from national defence forces, to operate' (The Times 11 December 1957: 11). By 1960, infrastructure is no longer exclusively connected with military bases and equipment, but refers to particular kinds of services. It is included in consideration of UK's aid to development and it included power supplies, railways, industrial development – infrastructure services that would not show economic returns in the short run (The Times 3 June 1960). Infrastructure and investment in infrastructure is squarely connected with modernization processes, such as in the case of Iran. One-third of the spending in Iran's 7-year plan is earmarked for communications and a quarter for social services. 'Such a high share going into the infrastructure', the article comments, 'means that directly productive and remunerative enterprises must be slow in getting under way' (The Times 17 August 1960). A large part of Oxfam aid to developing countries is reported to go to infrastructure projects such as colleges, roads and expensive secondary schools (The Times 11 December 1964). By the 1980s, infrastructure has lost the inverted commas and has acquired a series of attributes: it can be industrial, cultural or economic. In a discussion of the economic crisis in the socialist bloc states, *The Times*

emphasizes the 'serious neglect of Poland's economic infrastructure, the road and railways, the water and sewage systems, and the social network, the schools and hospitals' (Boyes 1985: 7).

These brief notes do not simply trace multiple meanings, but are indicative of different materializations of infrastructure: in military practices, development, culture or state modernization. They are indicative of how infrastructure matters within material practices of capitalist expansion and geopolitical division of the world. In this sense, the materialization of (in)security is also the effect of material and ideological practices of neoliberal globalization (Agathangelou, Bassichis, and Spira 2008; Agathangelou and Ling 2004). Critical infrastructure is also generated by the 'security industry' as part of a commercial enterprise that produces security as a commodity (Neocleous 2007). Yet, the commodification and fetishization of security and its inclusion in circuits of neoliberal political economy is not independent of the materialization of particular objects. Agency is also not thought in opposition to structures, but as possibilities for changing particular relations, differences and configurations of the world.

The Times articles, although suggestive of different materializations, have little to do with the ways in which concrete, asphalt, metal, oil, water, carbon and so on are produced, processed and used, and the forms of agency involved. Agency is not only human and institutions, but the agency of grids, nodes, tubes, soil, foundations and construction materials. All these intra-act with forms of knowledge, humans, institutional practices to create particular materializations of '(critical) infrastructure' to be protected. The next section turns to this understanding of securitization as a process of materialization through intra-action between material-discursive practices which enact agential cuts and draw boundaries. This means that the protection of critical infrastructure needs to be understood as a particular materialization which simultaneously is an intra-active reconfiguration of the world. As part of this reconfiguration, some materializations come to matter more than other and particular differences and boundaries are drawn: 'Material discursive apparatuses offer constraints on what is produced, but they also always produce particular exclusions' (Barad 2007: 14).

Materialities of critical infrastructure protection

> But what is truly amazing about this Doomsday stuff - given the alienation, the anonymity, the availability of the technology, society's vulnerability and all that - is how remarkably little it happens (Aaronovitch 1998).

Infrastructures are not simply out there, passive objects waiting to be secured in order for societies to function smoothly. Infrastructures break down, fail, corrode, rust, or, as the case may be, stop flowing, leak, outflow, seep and so on. Critical infrastructures are materialized in particular ways in debates about national security after 9/11. The securitization of critical infrastructure materializes through intra-action with other material-discursive practices: from civil engineering to legal practices of responsibility and from emergency planning to building design.

The Times archive is suggestive for the 'ongoing historicity' of matter. Infrastructures are not simply named as such, but they materialize in particular ways in intra-action and relation with other practices: military, developmental, modernizing.

What is missing is, however, a consideration of how the materiality of infrastructure is a 'form of doing, a congealing of agency' (Barad 2003: 821-2) in these intra-actions. A series of debates in the House of Commons about the definition of European Critical Infrastructure as part of the European Programme for Critical Infrastructure Protection (EPCIP) hint at this different materiality of infrastructure. There are not less than 40 reports by the European Scrutiny Committee that respond to the question of identifying critical infrastructures as either 'national' or 'European' (House of Commons 2007). At first sight, it appears as if naming of infrastructure as 'critical' and 'national' or 'European' were the result of authoritative speech acts and political interests. The Council directive proposes to name as European critical infrastructure any infrastructure whose destruction would affect two or more member states. Identifying what counts as European and what counts as national infrastructure is a more complex and contested question. The government is concerned that 'only infrastructures that are truly European and critical are designated'. Tony McNulty, the Minister Policing, Security and Community Safety repeatedly emphasizes that only 'truly European' and 'truly critical' infrastructure should be designated for the purposes of the Directive and EU programmes for critical infrastructure protection. Thus, although apparently a debate about the performative naming of infrastructure as either European or national and also critical, the debates point to the need to relate the 'true' character of infrastructure with the materiality of critical infrastructure. This 'true' character is not scientifically derived but is the result of the material characteristics of the infrastructure.

Designations of critical infrastructure as 'national' or 'European' cannot emerge in the absence of intra-actions between material-discursive practices. In the House of Commons debates, interdependency is at the heart of questions about which infrastructure is national and which is European:

> The loss of critical infrastructure in one country has the potential to have severe effects in another. The loss of power supply can hinder emergency services or transport, for example, and these knock-on effects are able to continue across borders. Following human error, an overload of the electricity transmission system in Germany in November 2006 resulted in some 50 million EU citizens losing power in Germany, Austria, France, Belgium, Italy, Spain and Portugal (House of Commons 2007).

The identification and designation of critical infrastructures as either national or European is entwined with legal and political practices. At the same time, the securitization of critical infrastructure is the result of intra-actions between material-discursive practices. Thus, one MP attempts to draw a 'pragmatic' differentiation between types of infrastructure:

> Nuclear power stations pose a serious risk to life, and disruption of energy supply might pose a serious risk to an economy, at least for a period. When the toilets do not work in a locality, however, that is not a serious risk (House of Commons 2007).

Rather than trivial, the given example is indicative of the materialization of critical infrastructure through intra-action between matter and meaning. Infrastructure is not simply a list, a collection of sectors and areas, but is intra-actively constructed through material-discursive practices. Nuclear power stations, energy supply and sewage systems intra-act in different ways. The materiality of infrastructure is not given, but comes to matter in particular ways.

In the European and UK debates on critical infrastructure protection, critical infrastructure is materialized as an assemblage of 'hard technologies embedded stably in place, which is characterized by perfect order, completeness, immanence and internal homogeneity rather than leaky, partial and heterogeneous entities' (Graham and Thrift 2007: 10). Infrastructures become materialized through their capacity for being disrupted and their effects upon the smooth functioning of society. This erases the materiality of infrastructure as itself generated and generative. Infrastructure is not a stable 'hardware', but its materiality comes to matter in this particular way at the expense of other materializations. For instance, concrete and steel, often the materials of choice for much of the urban infrastructure, are materialized through slow processes of corrosion. In 1992, a report on corrosion in the US considered that nearly 42% of the nations bridges were unable to handle traffic demand or structurally deficient (Fasullo 1992: 8). Corrosion raises the issue of repair of bridges, roads, water systems, sewers and public buildings which can fall by the side of securitized critical infrastructure. Twenty years ago, 'infrastructure' was defined primarily in debates about the adequacy of the nation's public works—which were viewed by many as deteriorating, obsolete, and of insufficient capacity (Moteff and Parfomak 2004). Subsequent definitions of infrastructure, particular 'critical' or 'vital' infrastructure have shifted the 'public works' definition of infrastructure towards private infrastructure and more recently, cyber-infrastructure. The materialization of infrastructure as stable and sturdy, able to be 'retrofitted' to security concerns or planned to 'design out crime and design in community safety' effaces the materiality of infrastructure as corrosive, decaying, slowly disintegrating. The different ways in which infrastructure come to matter and how different objects are materialized is erased in operational guidelines that the CPNI offers in the UK. Thus, protective measures start with the delimitation of a site: 'State the location and purpose of the site or building and any background comments on its priority or importance. State the boundaries of the site or building under consideration. This is to ensure that it is clear what land around buildings can be used for security measures' (Centre for the Protection of National Infrastructure (CPNI) 2010a: 6). Creating boundaries and protecting perimeters around critical infrastructure a series of measures that rematerialize public spaces: demarcation of boundary; deter entry into the area; protect against climb over; protect against cut through; outer and inner fence with sterile zone to support Perimeter Intruder Detection Systems; concealment of guards and/or activity (Centre for the Protection of National Infrastructure (CPNI) 2010a).

As boundaries are drawn, critical infrastructure is materialized as interconnected: gas flows, energy supplies flow, oil flows, transport flows and so on. Integrated circulatory processes appear indeed to be at the heart of the securitization of critical infrastructure, as many security scholars have noted in the wake of Foucault's analysis of biopolitics. This materialization of infrastructure as interconnected, circulating, flows that need to move unimpeded but can be stopped by 'bad circulation' (for example 'hostile

vehicle' as in the study from CPNI) obliterates the materialities of production.[5] The materialization of secure perimeter and boundary demarcation excludes materialities of reverse circulation – from inside out – as much as it obscures the materialization of infrastructure as corroding, decaying or in need of repair.

Similarly, the materialization of critical infrastructures as interconnected and circulatory effaces the materialities of production. Discussions of electricity in relation to critical infrastructure protection, for example, efface the materialities of energy production, particularly the relation between generation and use (Graham and Thrift 2007). The materialization of energy as simply flow effaces the material connections that exist in the generation of energy, the nodes and lines contained in the grid, their physical properties and connections:

> Electricity is nonstorable in large amounts, so an instantaneous balance between power production and power consumption plus transmission losses is needed. Various operational limits (voltage modules and angles, line flows, etc.) define the feasible region of a power system and must be enforced. Power flow paths depend on various physical system parameters (resistance, inductance, conductance and capacitance) that impose limits on flow when transferring power to and from different locations (Bompard, Napoli, and Xue 2009: 6).

In the debates in the House of Commons, solar energy is proposed as an alternative to traditional sources of energy given the ways solar energy does not create large-scale interdependencies. However, the materialization of solar energy can also suspend questions of generating energy and the materialities of access to energy. National energy grids have been set in place to ensure access to resources across the national territory.

The securitization of critical infrastructures implies that some infrastructures become materialized as infrastructures to be protected at the national or European level, while other materialities are relegated outside the purview of government. As Barad noted about the piezoelectric transducer, materialization entails boundary drawing and reconfiguration of the world. The securitization of critical infrastructure excludes other 'things' that make up the 'underbelly' of industrial and urban nations: accumulated waste, dirty water, or pollution. The identification of critical infrastructure for the purposes of counter-terrorism and 'all hazards' protection re-enacts the clean and well managed nation and city. Critical infrastructure protection changes the other ways in which infrastructure has been thought to matter, from issues of privatization to maintenance and from breakdown to conflict over access and distribution. We are far from the modern vision of infrastructure according to which 'networks and their nodal infrastructures were not just carrying water, electricity etc. into the city, but also embodied the promise and the dream of a good society' (Kaika and Swyngedouw 2000: 130). By contrast, critical infrastructures are linked with 'maintaining a defined *minimum* level of national or international law and order, public safety, economic life, public health, and environmental protection' (Bennett 2007: 57 emphasis mine). The materialization of emancipation through constructing connectivities and creating access to better living standards is surpassed by materialities of *minimum* levels. Through

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[5] For a critique of the exclusion of production from analyses of security focused on circulatory processes, see Aradau and Blanke (2010).

securitization, the access to critical infrastructure can be further limited or curtailed (Coward 2009: 412).

The securitization of critical infrastructure emphasizes disruption, interruption and failure. The all-hazards approach to critical infrastructure protection is concerned with the unpredictable and unexpected failure rather than the ordinary, everyday failures and disruption. The materialization of critical infrastructure protection downplays the agential character of infrastructure, its 'becoming' in relation to other practices. This materialization obscures the matters of everyday disruption, maintenance and repair as well as the becoming of nodes, grids, metal or concrete in entanglements with material-discursive practices.

Conclusion

This article has taken issue with the inattention to the materialization of non-human objects in the production of (in)security. Drawing on Karen Barad's feminist materialism, it has reintroduced material objects within conceptualizations of security practices and has proposed to redefine securitization as a process of materialization emerging out iterative intra-action with other material-discursive practices. Considering the role of materiality in the production of security phenomena allows us to conceptualize the boundary practices that are created through the naming of infrastructure as 'critical' and 'European'. The securitization of critical infrastructure materializes critical infrastructure in particular ways that exclude other materializations. From this perspective, the role of critical infrastructure protection is not thought through the opposition between population security and vital systems security as Collier and Lakoff have suggested. Infrastructure is not opposed to people, but is materialized in intra-actions between humans and non-humans, matter and meaning. In this process, the boundaries of what counts as human and non-human, what comes to matter and what not are defined.

The securitization of critical infrastructure reconfigures materialities in the world and creates new hierarchies and forms of exclusion. Interconnectivities and interdependencies do not exist independent of particular materialities – the material-discursive practices that securitize connectivity and dependency exclude materialities of the production of objects, for example. At the same time, these materializations of objects to be protected also intra-act with materialities of economic and geopolitical structures. While Barad's conceptualization of matter as materialization offers the possibility of analysing security practices as constituted and constitutive of matter and meaning, subjects and objects, she does not offer an understanding of how differences play out in the very production of security practices. Matters of capital accumulation, neoliberal governance, commodification and labour practices are intra-actively entangled with matters of circulation, flows, nodes, grids and so on. Although it is beyond the scope of this paper to explore how such entanglements are not equal and are themselves differentially enacted rather than just producing of difference, it remains a question mark that Barad's work does not directly address. However, her analysis of matter allows for an understanding of how practices of (in)security come to matter in ways that are simultaneously less contingent and less stable than theories of security have thought them to be.

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