Security That Matters: Critical Infrastructure and Objects of Protection

CLAUDIA ARADAU*

*Department of Politics and International Studies,
The Open University, Milton Keynes, UK*

Critical infrastructure protection is prominently concerned with objects that appear 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 neither is an empty receptacle of discourse nor has 'essential' characteristics; rather, it 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, 2004). Thus is the threat of terrorism described in a European Commission communication on critical infrastructure protection in the fight against terrorism. In Europe, critical infrastructures have emerged as an increasingly important priority in counter-terrorism activities since 9/11. 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

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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-1990s, since 9/11 innumerable documents have been produced by international organizations, governments and research institutions on the vulnerabilities and protection of critical infrastructure. 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 (CIP) have given prominence to the role of things – from computers to transport and energy infrastructure to the daily TV set – to such an extent that security scholars acknowledge that 'the (core) rationality of CIP is associated with physical objects' (Dunn Cavelty & 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 materiality of physical infrastructure and that of virtual infrastructure (Der Derian & 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' (Dacey, 2002: 33), 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 (2008: 22) 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. 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 nonhuman, matter and meaning. In this materialization of what is to be made

secure, infrastructure plays an agential role, both constraining and enabling particular configurations.

The present 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, Wæver & 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 & Van Munster, 2007, 2008; Dillon, 2008; Dillon & 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 objects as mere passive receptacles of human action, other approaches in the social sciences have for some time now tried to reconceptualize the role and agency of objects in the production of reality. Some have spoken of a 'material turn' in contradistinction 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

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[1] Hekman argues against the interpretation of Foucault as a 'linguistic constructionist' and shows – contra Latour – that Foucault is concerned with the interaction of the discursive and the material. However, although Foucault does emphasize the materiality of power and bodies, his rejection of the 'enigmatic treasure of "things" anterior to discourse' can lead to an interpretation of the 'objects of discourse' as subsumed to the linguistic (Foucault, [1969] 2002: 52).

neoliberal capitalism (Agathangelou & Ling, 2004; Neocleous, 2008) and its effects on the materialization 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 suggested by Martin Coward. 'Things' are not empty receptacles of discourses, nor do they have 'essential' characteristics that set them apart from humans. Rather, they are themselves agential and emerge in relation with material-discursive practices. Barad's work is thus doubly apt to help in the reconceptualization of materiality in security practices: on the one hand, she shows how distinctions between the natural and the social, and between objects and subjects, are not pre-given, but are materially and discursively produced; on the other, she develops conceptual tools that 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 that enacts 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 materialization of critical infrastructure as an object of protection enacts a reconfiguration of the world and how the production of (in)security depends on material-discursive practices 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 are understood in terms of fetishization and reification, in which the subject–object relation functions through its reformulation and instability (Pels, Hetherington & Vandenberghe, 2002). Marx's 'commodity fetishism' and 'reification of human relations' express particular transforma-

tions in capitalism. Mediated through commodity exchange, human relations appear as relations between things. Anthropologists have qualified the 'commodity fetishism' either by analysing 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 not only have a social life, but have a 'life' in themselves and enter into 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 rematerializing 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 & Tolia-Kelly, 2004). If, in social sciences, things have generally been derivative from social and human interactions, the 'material turn' sees both things and humans as co-present in the social world and as involved in the constitution of social order. As Jane Bennett (2004: 455) has put it, 'structures, 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 & Thrift (2007: 3) have argued that 'things 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 materiality into 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 & 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 infrastructures can be protected from all threats. For example, electricity transmission networks are too large to fence or guard', notes a communication from the European Commission (2004). Materiality can also be used in ways that emphasize the reification

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

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. In 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 from 2004, 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'. 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 concerning the agency of materiality does not efface, however, many points of contention about ontology and epistemology.

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, Wæver & 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 & Van Munster, 2007, 2008; Dillon & 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 enable us to understand the *relation* between matter and meaning rather than 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 post-humanist performativity with a brief sentence: 'Language has been granted too much power' (Barad, 2003: 801). In contradistinction to linguistic understandings of performativity, she proposes an account of post-humanist performativity that incorporates important material and discursive, social and scientific, human and non-human, and natural and cultural factors.[3] Barad's reformulations of performativity and materiality differ from those of Latour and actor-network theory, as she places it within feminist, post-colonial and post-structuralist debates. She points out that the way in which performativity is used within actor-network theory evacuates it of its political history, particularly in relation to the political role that performativity plays in feminist and post-structuralist theories (Barad, 2007: 410–411n18).[4] Thus, Barad's concern with agency and matter as materialization leads her to consider not only the working of 'nonhuman

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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] Actor-network theory has been criticized for doing away with normative and critical theory.

forces' but also the productive working of geopolitics, economics and history as theorized by feminist and post-colonial scholars.

Although both Butler and Foucault take into account the materiality of the body and its materialization through regulative practices, Barad argues that they fail to provide an account of *how* both materiality and language matter. For Butler (1993), the body emerges through iterative performative processes. Materialization does not need an external referent, as it is produced through regulatory norms. Yet, contra Butler, Barad (1998: 108) contends that 'materialization is not only a matter of how discourse comes to matter but also how matter comes to matter'. 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: 194). 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, however, may be 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 how the partition of space in prison makes possible the disciplining of bodies: the inmates cannot see whether they are watched or not.

However, even if one needs to qualify some of Barad's reading of Foucault, her astute point is 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 is that it failed to theorize the relationship between discursive and non-discursive practices. Thus, matter cannot be simply thought of 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 reduced to or explained in terms of the other (Barad, 2007: 152).

Barad shows not only that boundaries and objects are not pre-given, but that 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.[5] Boundaries are drawn and distinctions are made through intra-active entanglements. Matter is therefore 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 term '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 added)

Barad's conceptual framework has been used to understand the materiality of the body by several feminist scholars (Colls, 2007; Fraser & 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.

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[5] Jenny Edkins (2003) has explicitly related quantum physics and its principles of uncertainty and complementarity with a reading of security in her interpretation of a play by Michael Frayn that sets out the encounter between Bohr and Heisenberg in Copenhagen. In the introduction to her 2007 book, however, Barad (2007: 6) is critical of Frayn's interpretation of quantum physics and the uncertainty principle as a 'kind of analogical thinking'. For her, quantum physics forces us to confront a series of ontological and epistemological issues, such as 'the conditions for the possibility of objectivity, the nature of measurement, the nature of nature and meaning making, and the relationship between discursive practices and the material world' (Barad, 2007: 24).

In the relevant article (reprinted as a chapter in her book *Meeting the Universe Halfway)*, Barad (1998) uses the piezoelectric crystal as a tool to explore the relationship between the material and the discursive more generally. Her arguments about the piezoelectric transducer are important for reconsidering non-human materiality, and in particular the role of critical infrastructure as an object of security. As an apparatus, the piezoelectric transducer enacts '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 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 their use has become a normalized everyday practice for visualizing foetuses,[6] 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). When sound waves received from the human body reach the transducer, they are converted into electric signals that can be visually displayed. The sonogram images that appear on the computer screen are the result of the intra-action between the transducer (the apparatus) and the 'foetus' (the object). Transducers also materialize in relation to particular acoustic impedances and resonant frequencies. Producing a good picture of a foetus, Barad (2007) points out, is not that simple. The transducer is not simply a 'thing', an apparatus of measurement, as the foetus is not simply a 'body'. Both are dynamically produced through intra-action and are open to rearticulation and reshaping. The foetus becomes knowable because of the ultrasound technology that 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, the educational backgrounds of engineers, etc. This rendering of materiality is particularly close to Foucault's notion of the *dispositif* and his analysis of the materialization of bodies. Nonetheless, Barad (1998, 2007) argues that Foucault's analysis of non-human bodies is not cognizant 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

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[6] See, for example, Mitchell (2001).

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 foetus, 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 foetus. The foetus itself is constituted through material-discursive practices of bodily production. The autonomy and separation of the foetus is the result of practices that deny the intra-action between the maternal body, the foetus and other apparatuses. The foetus is materialized as a free-floating, separate body within a maternal 'environment'.

  These practices draw boundaries and enact exclusions by creating materialities that 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 foetus at the expense of the materiality of the maternal body redefines questions of accountability, while also overlooking the particular conditions of material-discursive practices that make these identifications possible. By reconfiguring the world and redrawing borders between what 'matters' and what does not, 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 obliterate the infertility caused by environmental racism. Barad's post-humanist performativity can be instrumental in analysing not just the intra-actions between matter and meaning in processes of securitization, but also 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 the Clinton administration in 1996. 'Critical infrastructure' allegedly signifies a difference from earlier usages of 'infrastructure'. While the destruction of infrastructure has been part of military strategy to weaken the enemy in a war, its transformation into a matter of national security has been variously located either during the Cold War (Collier & Lakoff, 2007) or after 9/11 (Center for History and New Media, 2009). Military strategy could also entail the destruction of one's own infrastructure. By contrast, the securitization of critical infrastructure assumes that infrastructure is the very foundation of society. 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 (1997) was symbolically entitled 'Critical Foundations'. Definitions of critical infrastructure list heterogeneous elements, from communications, emergency services, energy, finance, food, government and health to the transport and water sectors (Centre for the Protection of National Infrastructure, 2009). The argument about the necessity to protect critical infrastructure is generally framed along the following lines (with little variation from one report to another or from one 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 (2009) defines the effects of any failure in national infrastructure as leading to 'severe economic damage, grave social disruption, or even large scale loss of life'.

Labelling infrastructures as critical for the purposes of protecting them against terrorist attacks is a securitizing 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 labelling as 'critical' and in need of protection against potential terrorist attacks and/or other hazards. The UK's Centre for the Protection of Critical Infrastructure (2010b) 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.

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 (e.g. tanks or polluted waters) play a facilitating role in the process of securitization (Buzan, Wæver & 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: are they prior and exterior to speech acts, and in that sense excluded from the process of construction (Butler, 1993: 28), or are they formed through speech acts? As the next section will show, the Copenhagen School 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 & Lobo-Guerrero (2008: 267), 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'. 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 & 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 and 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 and 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. Thus it remains unclear how the materiality of infrastructure is both generative and generated in Barad's terms.

Even when there is a focus on the rationalities and technologies that make up particular *dispositifs* of security, materialities of non-human objects are not explicitly theorized.[7] Although the *dispositif* has *material* effects in terms 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

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[7] See, for example, Aradau & Van Munster (2007); Huysmans (2006); Lippert & O'Connor (2003).

intra-act with other social and political practices, discourses, forms of knowledge and materialities.

Moreover, these Foucauldian 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 & Andrew Lakoff (2007, 2008) 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 onwards, 'total war' and civil defence during the Cold War shifted this understanding towards system vulnerability. Over the 1960s and 1970s, Collier & Lakoff 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. Despite the shift that they locate from population to vital systems as referent objects of security, Collier & 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) become 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, and police and military expertise, as well as nodes, flows, soils, building materials, etc. Yet, this materialization is also a historical process that 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 article to undertake a genealogy of (critical) infrastructure, a brief overview of the historicity of infrastructure provides an indication of the missing elements. Not only is 'critical infrastructure' a relatively recent coinage, the term 'infrastructure' also only came into use in the 1950s. The Times Digital Archive, which goes back to 1785, only locates the use of infrastructure in 1950 in an article on 'Western Defence Contribution' (*The Times*, 1950). The article reports that £3 million has been allocated to new projects that are referred to as '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 to 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*, 1957). By 1960, infrastructure is no longer exclusively connected with military bases and equipment, but refers to particular kinds of services. The term is used in a consideration of the UK's development aid and it includes power supplies, railways, industrial development – infrastructure services that would not show economic returns in the short term (*The Times*, 1960a). Infrastructure and investment in infrastructure are squarely connected with modernization processes, as in the case of Iran. One-third of the spending in Iran's seven-year plan is earmarked for communications and a quarter for social services. 'Such a high share going into the infrastructure', an article comments, 'means that directly productive and remunerative enterprises must be slow in getting under way' (*The Times*, 1960b). A large part of Oxfam's aid to developing countries is reported to go to infrastructure projects such as colleges, roads and expensive secondary schools (*The Times*, 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 & Spira, 2008; Agathangelou & 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.

   These articles from *The Times*, 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 institutional, but the agency of grids, nodes, tubes, soil, foundations and construction materials. All these intra-act with forms of knowledge, humans and 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

that enact agential cuts and draw boundaries. This means that the protection of critical infrastructure needs to be understood as a particular materialization that is simultaneously an intra-active reconfiguration of the world. As part of this reconfiguration, some materializations come to matter more than others 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 since 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 Digital 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: 821–822) in these intra-actions. A series of debates in the UK 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. A proposal for an EU Council directive on setting up a critical infrastructure information warning network (CIWIN) labels as 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 for

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, though apparently 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: Column 1518)

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 member of parliament 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: Column 1523)

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 & 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 USA considered that nearly 42% of the nation's 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 & Parfomak, 2004). Subsequent definitions of infrastructure, particularly '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 with the aim of 'designing out crime and designing in community safety' (Office of the Deputy Prime Minister, 2004: 45) effaces the materiality of infrastructure as corrosive, decaying, slowly disintegrating. The different ways in which infrastructure comes to matter and how different objects are materialized are 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, 2010a: 6). Creating boundaries and protecting perimeters around critical infrastructure is a series of measures that rematerialize public spaces: demarcation of boundary; deter entry into the area; protect against attempts to climb over; protect against attempts to 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, 2010a).

As boundaries are drawn, critical infrastructure is materialized as interconnected: gas flows, the flow of energy supplies, 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, a 'hostile vehicle', as in the study from the CPNI) obliterates the materialities of production.[8] The materialization of secure perimeter and boundary

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

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 productions. 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 & 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 & Xue, 2009: 6).

In the debates in the UK 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 & 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 added).

The materialization of emancipation through constructing connectivities and creating access to better living standards is surpassed by materialities of *minimum* levels. Through 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 of 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 & 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 the present article to explore how such entanglements are not equal and are themselves differentially enacted rather than just producing of difference, this remains an issue 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.

References

Aaronovitch, David, 1998. 'Comment: The Bombers Are Among Us and We'll Never Know Their Names', *The Independent*, 6 March.

Agathangelou, Anna M. & L. H. M. Ling, 2004. 'Power, Borders, Security, Wealth: Lessons of Violence and Desire from September 11', *International Studies Quarterly* 48(3): 517–538.

Agathangelou, Anna M.; M. Daniel Bassichis & Tamara L. Spira, 2008. 'Intimate Investments: Homonormativity, Global Lockdown, and the Seductions of Empire', *Radical History Review* 100: 120–143.

Ahmed, Sarah, 2008. 'Open Forum Imaginary Prohibitions: Some Preliminary Remarks on the Founding Gestures of the New Materialism', *European Journal of Women's Studies* 15(1): 23–39.

Anderson, Ben & Divya Tolia-Kelly, 2004. 'Matter(s) in Social and Cultural Geography', *Geoforum* 35(6): 669–674.

Appadurai, Arjun, 1988. 'Introduction: Commodities and the Politics of Value', in Arjun Appadurai, ed., *The Social Life of Things: Commodities in a Cultural Perspective*. Cambridge: Cambridge University Press (3–63).

Aradau, Claudia & Tobias Blanke, 2010. 'Governing Circulation: A Critique of the Biopolitics of Security', in Miguel de Larrinaga & Marc Doucet, eds, *Security and Global Governmentality: Globalization, Governance and the State*. London: Routledge (44–58).

Aradau, Claudia & Rens van Munster, 2007. 'Governing Terrorism Through Risk: Taking Precautions, (Un)Knowing the Future', *European Journal of International Relations* 13(1): 89–115.

Aradau, Claudia & Rens van Munster, 2008. 'Taming the Future: The Dispositif of Risk in the "War on Terror"', in Louise Amoore & Marieke de Goede, eds, *Risk and the War on Terror*. London: Routledge (23–40).

Bakker, Karen & Gavin Bridge, 2006. 'Material Worlds? Resource Geographies and the "Matter of Nature"', *Progress in Human Geography* 30(1): 5–27.

Barad, Karen, 1998. 'Getting Real: Technoscientific Practices and the Materialization of Reality', *Differences: A Journal of Feminist Cultural Studies* 10(2): 87–128.

Barad, Karen, 2003. 'Posthumanist Performativity: Toward an Understanding of How Matter Comes To Matter', *Signs: Journal of Women in Culture and Society* 28(3): 801–831.

Barad, Karen, 2007. *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning*. Durham, NC: Duke University Press.

Bennett, Brian T., 2007. *Understanding, Assessing and Responding to Terrorism: Protecting Critical Infrastructure and Personnel*. Hoboken, NJ: John Wiley & Sons.

Bennett, Jane, 2004. 'The Force of Things: Steps Toward an Ecology of Matter', *Political Theory* 32(3): 347–372.

Bennett, Jane, 2010. *Vibrant Matter: A Political Ecology of Things*. Durham, NC: Duke University Press.

Bompard, Ettore; Roberto Napoli & Fei Xue, 2009. 'Analysis of Structural Vulnerabilities in Power Transmission Grids', *International Journal of Critical Infrastructure Protection* 2(1–2): 5–12.

Boyes, Roger, 1985. 'Winter in East Europe', *The Times*, 27 November.

Braun, Bruce, 2005. 'Environmental Issues: Writing a More-Than-Human Urban Geography', *Progress in Human Geography* 29(5): 635–650.

Burgess, J. Peter, 2007. 'Social Values and Material Threat: The European Programme for Critical Infrastructure Protection', *International Journal of Critical Infrastructures* 3(3/4): 471–487.

Butler, Judith, 1993. *Bodies That Matter: On the Discursive Limits of 'Sex'*. London: Routledge.

Buzan, Barry; Ole Wæver & Jaap de Wilde, 1998. *Security: A New Framework for Analysis*. Boulder, CO: Lynne Rienner.

Castree, Noel, 2003. 'Environmental Issues: Relational Ontologies and Hybrid Politics', *Progress in Human Geography* 27(2): 203–211.

Center for History and New Media, 2009. 'Critical Infrastructure Protection: A Brief Overview'; available at http://chnm.gmu.edu/cipdigitalarchive/overview.php (accessed 21 February 2009).

Centre for the Protection of National Infrastructure (CPNI), 2009. '*What We Do*'; available at http://www.cpni.gov.uk/About/whatWeDo.aspx (accessed 21 February 2009).

Centre for the Protection of National Infrastructure (CPNI), 2010a. 'Guide for Producing Operational Requirements for Security Measures'; available at http://www.cpni.gov.uk/Docs/measures-operational-requirements-guide.pdf (accessed 21 February 2009).

Centre for the Protection of National Infrastructure (CPNI), 2010b. 'Protecting Against Terrorism', 3rd edn; available at http://www.cpni.gov.uk/Docs/protecting-against-terrorism-3rd-edition.pdf (accessed 19 June 2010).

Collier, Stephen & Andrew Lakoff, 2007. 'The Vulnerability of Vital Systems: How "Critical Infrastructure" Became a Security Problem', in Myriam Dunn & Kristian Soby

Kristensen, eds, *Securing 'the Homeland': Critical Infrastructure, Risk, and (In)Security*. Abingdon: Routledge (17–39).

Collier, Stephen & Andrew Lakoff, 2008. 'Distributed Preparedness: The Spatial Logic of Domestic Security in the United States', *Environment and Planning D: Society and Space* 26(1): 7–28.

Colls, Rachel, 2007. 'Materialising Bodily Matter: Intra-Action and the Embodiment of "Fat"', *Geoforum* 38(2): 353–365.

Commission on Critical Infrastructure Protection, 1997. *Critical Foundations: Protecting America's Infrastructures.* Washington, DC: Commission for Critical Infrastructure Protection.

Coward, Martin, 2006. 'Against Anthropocentrism: The Destruction of the Built Environment as a Distinct Form of Political Violence', *Review of International Studies* 32(3): 419–437.

Coward, Martin, 2009. 'Network-Centric Violence, Critical Infrastructure and the Urbanization of Security', *Security Dialogue* 40(4–5): 399–418.

Dacey, Robert F., 2002. 'Critical Infrastructure Protection: Significant Challenges Need To Be Addressed', Testimony Before the Subcommittee on Government Efficiency, Financial Management and Intergovernmental Relations, Committee on Government Reform, US House of Representatives, GAO-02-961T; available at http://www.gao.gov/new.items/d02961t.pdf (accessed 20 May 2010).

Davis, Noela, 2009. 'New Materialism and Feminism's Anti-Biologism: A Response to Sara Ahmed', *European Journal of Women's Studies* 16(1): 67–80.

Dean, Mitchell, 1999. *Governmentality: Power and Rule in Modern Society*. London: Sage.

Der Derian, James & James Finkelstein, 2008. 'Critical Infrastructures and Network Pathologies: The Semiotics and Biopolitics of Heteropolarity', in Myriam Dunn Cavelty & Kristian Soby Kristensen, eds, *Securing 'the Homeland': Critical Infrastructure, Risk and (In)Security*. London: Routledge (84–106).

Dillon, Michael, 2008. 'Underwriting Security', *Security Dialogue* 39(2–3): 309–332.

Dillon, Michael & Luis Lobo-Guerrero, 2008. 'Biopolitics of Security in the 21st Century: An Introduction', *Review of International Studies* 34(2): 265–292.

Dunn Cavelty, Myriam & Kristian Soby Kristensen, 2008. 'Introduction: Securing "the Homeland": Critical Infrastructure, Risk and (In)Security', in Myriam Dunn Cavelty & Kristian Soby Kristensen, eds, *Securing 'the Homeland': Critical Infrastructure, Risk and (In)Security*. London: Routledge (1–14).

Ebert, Teresa, 2005. 'Rematerializing Feminism', *Science & Society* 69(1): 38–55.

Edkins, Jenny, 2003. 'Security, Cosmology, Copenhagen', *Contemporary Politics* 9(4): 361–370.

European Commission, 2004. 'Communication from the Commission to the Council and the European Parliament: Critical Infrastructure Protection in the Fight Against Terrorism', Com(2004)702; available at http://europa.eu/legislation_summaries/justice_freedom_security/fight_against_terrorism/l33259_en.htm (accessed 12 March 2010).

Fasullo, E. J., 1992. 'Infrastructure: The Battlefield of Corrosion', in Victor Chaker, ed., *Corrosion Forms and Control for Infrastructure*. Philadelphia, PA: American Society for Testing and Materials (1–16).

Foucault, Michel, 1980. *Power/Knowledge: Selected Interviews & Other Writings 1972–1977*. Brighton: Harvester.

Foucault, Michel, [1969] 2002. *The Archaeology of Knowledge*. London: Routledge.

Fraser, Suzanne & Kylie Valentine, 2006. 'Making Blood Flow: Materializing Blood in Body Modification and Blood-Borne Virus Prevention', *Body & Society* 12(1): 97–119.

Graham, Stephen & Nigel Thrift, 2007. 'Out of Order: Understanding Repair and Maintenance', *Theory Culture Society* 24(3): 1–25.

Hansen, Lene, 2000. 'The Little Mermaid's Silent Security Dilemma and the Absence of Gender in the Copenhagen School', *Millenium* 29(2): 285–306.

Hekman, Susan, 2009. 'We Have Never Been Postmodern: Latour, Foucault and the Material of Knowledge', *Contemporary Political Theory* 8(4): 435–454.

House of Commons, 2007. 'Protection of Critical Infrastructure'; available at http://www.parliament.the-stationery-office.com/pa/cm200607/cmhansrd/cm070502/debtext/70502-0004.htm (accessed 25 May 2008).

Huysmans, Jef, 2006. *The Politics of Insecurity: Fear, Migration and Asylum in the EU*. London: Routledge.

Jackson, Peter, 2000. Rematerializing Social and Cultural Geography, *Social & Cultural Geography* 1(1): 9–14.

Kaika, Maria & Erik Swyngedouw, 2000. 'Fetishizing the Modern City: The Phantasmagoria of Urban Technological Networks', *International Journal of Urban and Regional Research* 24(1): 120–138.

Latour, Bruno, 1996a. *Aramis, or, the Love of Technology*. Cambridge, MA: Harvard University Press.

Latour, Bruno, 1996b. 'On Actor-Network Theory', *Soziale Welt* 47(4): 369–381.

Latour, Bruno, 2000. 'When Things Strike Back: A Possible Contribution of "Science Studies" to the Social Sciences', *The British Journal of Sociology* 51(1): 107–123.

Latour, Bruno, 2005. *Reassembling the Social: An Introduction to Actor-Network-Theory*. Oxford: Oxford University Press.

Lees, Loretta, 2002. 'Rematerializing Geography: The "New" Urban Geography', *Progress in Human Geography* 26(1): 101–112.

Lippert, Randy & Daniel O'Connor, 2003. 'Security Assemblages: Airport Security, Flexible Work, and Liberal Governance', *Alternatives: Global, Local, Political* 28(3): 331–359.

Lipschutz, Ronnie D., 2008. 'Imperial Warfare in the Naked City: Sociality as Critical Infrastructure', *International Political Sociology* 2(3): 204–218.

Lobo-Guerrero, Luis, 2007. 'Biopolitics of Specialist Risk: Kidnap and Ransom Insurance', *Security Dialogue* 38(3): 315–334.

McDonald, Matt, 2008. 'Securitization and the Construction of Security', *European Journal of International Relations* 14(4): 563–587.

Miller, Daniel, 1998. 'Why Some Things Matter', in Daniel Miller, ed., *Material Culture: Why Some Things Matter*. London: University of Chicago Press (3–21).

Mitchell, Lisa M., 2001. *Baby's First Picture: Ultrasound and the Politics of Fetal Subjects*. Toronto: University of Toronto Press.

Moteff, John & Paul Parfomak, 2004. 'Critical Infrastructure and Key Assets: Definition and Identification', Congressional Service Report RL32631; available at http://www.fas.org/sgp/crs/RL32631.pdf (accessed 19 May 2008).

Neocleous, Mark, 2007. 'Security, Commodity, Fetishism', *Critique* 35(3): 339–355.

Neocleous, Mark, 2008. *Critique of Security*. Edinburgh: Edinburgh University Press.

Office of the Deputy Prime Minister, 2004. 'Safer Places: The Planning System and Crime Prevention'. London: The Home Office; available at http://www.communities.gov.uk/documents/planningandbuilding/pdf/147627.pdf (accessed 30 July 2010).

Pels, Dick; Kevin Hetherington & Frederic Vandenberghe, 2002. 'The Status of the Object: Performances, Mediations, and Techniques', *Theory, Culture & Society* 19(5–6): 1–21.

Philo, Chris, 2000. 'More Words, More Worlds: Reflections on the Cultural Turn and Human Geography', in Ian Cook, David Crouch, Simon Naylor & James Ryan, eds, *Cultural Turns/Geographical Turns: Perspectives on Cultural Geography*. Harlow: Prentice Hall (23–56).

Preda, Alex, 1999. 'The Turn to Things: Arguments for a Sociological Theory of Things', *Sociological Quarterly* 40(2): 347–366.

Rose, Nikolas, 1999. *Powers of Freedom: Reframing Political Thought*. Cambridge: Cambridge University Press.

Salter, Mark B., 2008. 'The Global Airport: Managing Space, Speed and Security', in Mark B. Salter, ed., 2008. *Politics at the Airport*. Minneapolis, MN: University Of Minnesota Press (1–28).

Stritzel, Holger, 2007. 'Towards a Theory of Securitization: Copenhagen and Beyond', *European Journal of International Relations* 13(3): 357–383.

The Times, 1950. 'Western Defence Contribution', 12 July.

The Times, 1957. 'Can Nato Meet Its Challenge?', 11 December.

The Times, 1960a. 'United Kingdom Aid for Development', 3 June.

The Times, 1960b. 'Planning for a New Iran', 17 August.

The Times 1964. 'Oxfam Allocated £2¼ M. in a Year', 11 December.

Whatmore, Sarah, 2006. 'Materialist Returns: Practising Cultural Geography in and for a More-Than-Human World', *Cultural Geographies* 13(4): 600–609.