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The tactile topologies of *Contagion*

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Can we reconfigure recent work on topological space, so productively brought to bear in an understanding of power in geography, to understand the spatialities of and among flesh, objects and viral life? Here we expand on topology via touch – a ‘tactile topology’ – that focuses on the material connections among mobile bodies. The engine of topological transformation thus becomes the various materials and forces that grab onto each other, interpenetrating and reassembling at various speeds and intensities, such that diverse proximities and distances, contacts and connections, are made and remade. Grounding our argument via a reading of Steven Soderbergh’s 2011 film, *Contagion*, which tracks the virulent outbreak of a largely fatal zoonotic disease, we speculate on what a tactile topology might feel like, and in particular on what touch implies for the concept of topology.

Key words topology; hapticality; touch; microcalities; Deleuze; Irigaray

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Don’t talk to anyone. Don’t touch anyone. (From the advertising poster for *Contagion*)

Someone doesn’t have to weaponize the bird flu. The birds are doing that. (Dr Ellis Cheever [Laurence Fishburn], *Contagion*)

It’s transmission. So we just need to know which direction. (Dr Leonora Orantes [Marion Cotillard], *Contagion*)

Introduction

Steven Soderbergh’s *Contagion*, released in cinemas in 2011, draws from international headlines and bestselling books¹ to tell a story of the spread of a pandemic infectious disease and the medical and security institutions tasked with monitoring, evaluating and responding to it. The virus that moves through *Contagion* is predicated upon extant zoonotic diseases – a zoonosis being any disease that originates in animal reservoirs, perhaps circulates through several species, and then ‘jumps’ to humans. The film’s pathogen, meningoencephalitic virus one, or MEV-1, is modelled on the real life and very deadly Hendra and Nipah viruses, which are thought to have their origins in the flying foxes, or bats, of the genus *Pteropus*, found in Southeast Asia and Australia, and which travel to humans via horses and pigs, respectively (Centers for Disease Control and Prevention 2009).² Inspiration for *Contagion*’s MEV-1 came from the Australian research team, led by Linfa Wang, which discovered the Hendra and Nipah viruses in the 1990s.³ These are, notes microbiologist Benhur Lee, ‘notorious assassins ... the deadliest paramyxoviruses known to infect humans ... [and] the only paramyxoviruses ...

classified as biosafety level 4 (BSL4) pathogens owing to their extreme virulence and bioterrorism potential’ (Lee 2011, np).

The film invites a number of readings relevant to contemporary geography, especially on the limits of state surveillance and governance relative to the irruptive immanent materialisms of viral life. For example, *Contagion* references the 2003 SARS outbreak, as Minnesota’s public officials are seen bemoaning the manner in which public fear and anxiety around SARS escalated, damaging business and shaking public confidence in science-based expert advice. Visual references to the audience’s prior experiences and imagery of SARS abound, such as face-masks and temperature screenings at airports. The scriptwriter for *Contagion*, Scott Z. Burns, was said to have long been

fascinated with how diseases move through the world and society’s response. [He] wanted to explore the secondary damage that a disease outbreak would cause, such as its effects on air travel, hospitals or truckers trying to cross state lines. (Krisberg 2011, np)

The film’s myriad mobilisations also suggest, as Bruce Braun (2008) remarked in regard to the 2003 SARS outbreak in Toronto, a topology⁴ of bodies that might be discerned in such epidemics, ones that rework some preconceived notions as to the ‘where’ as well as the ‘what’ of a virus (see also Ali and Keil 2007). By this Braun means, first, that human bodies are not contained within rigid time spaces, nor are they constituted as self-sufficient, self-reproducing entities. Rather, bodies are ‘stretched’ across space and time as they incorporate and shed biological material, and as they are affected in diverse ways by the environments they

inhabit. Second, there is no one set of connections along which this stretching occurs. Rather, and by virtue of our many contingent reassemblings, we are embedded in the myriad topologies of other organisms, objects and technologies, each of which has its own particular shape and velocity in relation to others. In *Contagion*, the emphasis is on a largely uncontained, proliferating virus, over and against the interrupted, usually predictable, flows of people and things. Presented in the ‘hyperlink cinema’ format that director Steven Soderbergh has become famous for in films such as *Traffic* (2000), which he directed, and *Syriana* (2005), which he produced, the film is marked by seemingly separate plot-lines that are brought together into a coherent narrative by virtue of the objects that each protagonist touches, objects that, becoming infectious fomites, ensure the spread of the MEV-1 virus from host to host.

Contagion is a thriller in which an underlying spatiotemporal urgency – a race-against-the-clock to cordon off parts of humanity to save others – is doubly juxtaposed: first, against a necessarily methodical if high-tech version of ‘shoe leather epidemiology’, wherein reconstructions of person-to-person and person-to-object contacts are investigated in order to understand the virus’s origins and its transmission pathways; and second to the point-by-point spaces of the virus’s rapid and heteroscedastic dispersion. As such, it invites comparisons with other topological spacetimes – including those that have their origins in actor-network-theory (e.g. Law and Mol 2001; Serres and Latour 1995) – as well as more recent efforts to explore the relevance of topological thinking to the discipline of geography. Here we cannot do justice to the details of topology; these have been usefully and recently laid out by John Allen (2011a) and discussed by a number of commentators (Coleman 2011; Elden 2011; Latham 2011; Paasi 2011; also Allen 2009; Martin and Secor 2014; Secor 2013; Shields 2012). We do, however, caution against confusion over topology: namely, some invocations of the concept disclose it to be less of an ontological enhancement of ‘traditional’ spatial theories (i.e. absolute, relative or relational: see Jones 2009) and more of a spatial model, or imaginary, to cope with a perceived uptick in the complexity and malleability of socio-spatial processes. If this is correct, then topology would appear to lack the grounds necessary for ontological status, and as such its scope of application may be limited – to, for example, descriptions of globalisation.

This is not a condemnation of topological thinking, for along with others (Jones 2009; Latham 2011; Thrift 2004) we applaud efforts that cross borders (in topology, this would be mostly mathematics and analytic philosophy) and expand the discipline’s conceptual repertoire. But we also maintain that within topology’s

assorted figurines of twists, stretches and folds, there can be tendencies to ‘black box’ all number of intimate and immanent materialities (also see Coleman 2011 on topology and spatial practices). Perhaps paradoxically, the fictionalised (but nonetheless plausible) account of viral spread in *Contagion* offers a reality check to an unfettered topographical imaginary. Above all, its *mise-en-scène* follows the pathways of touch, offering viewers a close-range (Deleuze and Guattari 1987, 492) account of touching that is attentive not only to viral life and corporeal vulnerabilities, but also to the complex spatialities they produce. In what follows we first discuss what we mean by ‘tactile topologies’ – a term we propose by meshing writings on touch by Luce Irigaray with the geophilosophy of Gilles Deleuze and Félix Guattari. We then animate this discussion with an exploration of Soderbergh’s *Contagion*. We conclude with comments on the status of topology in the field of geography.

Tactile topologies

When Cindi Katz in 2001 critiqued *topographic* inquiry as a top-down fragmentation of space into parcels useful to both capitalism and the state, she contrasted the concept with what she called ‘countertopographic’ accounts. Deploying the metaphor of the contour line to represent the commonalities of dispersed social relations and resistances rather than elevations, Katz’s topography offers

a way of theorizing the connections of vastly different places made artefactually discrete by virtue of history and geography but which also reproduce themselves differently amidst the common political-economic and socio-cultural processes they experience. (2001, 1229)

While her alternative mapping of places, and the ties that bind them, has continued to animate feminist geopolitics under the heading of countertopography (for example, Dixon 2011; Pratt and Yeoh 2003), it is topology, over and against the topographic, that has captured the imagination of those geographers aiming to understand the warps of power, governance and economy under globalisation (Allen 2009; Allen and Cochrane 2010; Amin 2002 2004 2007; Latham 2002).

It has done so, according to Allen, because ‘topology poses a challenge to those more clear-cut topographies common to the spatial arrangements of territorial and networked power’ (2011a, 284). Significantly, Allen points to the need for a new description that better captures the structure and form of contemporary human geographies:

The idea that power and authority, for instance, are, in some sense, located or at least locatable within a given territory or that power may be extended through or over increasingly complex topographical landscapes is a more or less

ingrained part of our geographic imaginations. Ingrained, in the sense that we are accustomed to thinking about power as, on the whole, an observable feature of any given territory or that its extension across a flat surface is, for the most part, relatively unproblematic. We can broadly pinpoint its location in certain bodies and institutions and ordinarily map the contours of their authority across a defined area. Such topographical features are not simply wrong or misplaced, but I would argue that neither do they capture many of the spatial reworkings of authority and leverage that shapes much of what goes on around us today. In certain respects, our conventional geometric descriptions are now, for better or worse, somewhat exhausted as a spatial vocabulary of power. (2011a, 285)

This view is echoed at the urban level by Ash Amin, who writes:

as spatial entities cities have become agglomerations that no longer cohere internally to function as organisms in their own right. Thus, while much of the world can now be read from what goes on in cities, what remains of cities as territorial entities is no longer self-evident. The everyday urban has become part of a world space of many geographies of varying spatial reach and composition, linked to the rise of transnational flows of ideas, information, knowledge, money and people; trans-local networks of organization and influence, including multinational corporations and global financial institutions, international governance regimes and transnational cultural networks; and technologies ensuring the rapid transmission of distant developments such as monetary swings, environmental disasters, and the actions of the powerful ... Much of this is well known from the literature on globalization, but perhaps less recognized is the degree to which the changes amount to a radical shift in socio-spatial organization, towards forms of topological organization that no longer correspond to neat scalar or territorial packages. (2007, 102)

One can pick up several fronts of critique against this line of thinking. In the first, the concept of topology is potentially seen as a 'bad abstraction', as for example when it animates fly-over accounts of networked spatialities made up of 'frictionless spaces and flows' (Jessop *et al.* 2008, 391; on 'flowsterism' also see Doel 1996; Marston *et al.* 2005, 423–4). Similarly, Martin Jones rejects topology – as one part of a wider body of work on relational space – when its view of place and politics as 'encountered, performed, and fluid' remains unanchored (2009, 492).⁵ In their defence, it should be noted that both Allen and Amin do, in our reading, avoid the excesses of fluid vocabularies. Both show repeated attentiveness not only to the materialities of power and globalisation, respectively, but also to the processes of inertia and coagulation that operate against easy topological rearrangements.

The second line of criticism concerns the potential ahistoricism – even faddishness – of topology. What, we might ask, is it about the contemporary situation that

theories of topographical space cannot address? Each of the commentators on Allen's (2011a) recent paper wonder aloud about this point, with Mat Coleman (2011, 310) asking about the validity of a geographic calendar that would draw distinct lines between topographically-defined power geometries and power topologies; Stuart Elden (2011) and Anssi Paasi (2011) historicising⁶ not only the concept of topology but questioning its analytic precision; and Alan Latham (2011) arguing that Allen's topology is merely a 'supplement' and does not go far enough in challenging how we think about power and new objects of geographic inquiry. In response, Allen asks a self-posed question, '[I]s it the world today that is becoming more topological or merely our grasp of it?' (2011b, 317). Though the answer is qualified, he seems to side with the former, responding that he is interested in why 'topology seems to *work better* at grasping the mix of time-spaces embedded in the here and now of much social and material interaction' (2011b, 317; emphasis in original).

The commentary from Coleman in particular – as well as Allen's deployment of the term 'grasp' in the above two quotes – points to a third line of criticism, one that will concern us moving forward, and that is the ontological status of topology (also see Secor 2013). Coleman applauds Allen's attentive, 'quieter register' of power, but at the same time he cautions readers not to lose sight of the spatial practices that ground power, for these are the motors behind topological transformation.⁷ Perhaps anticipating the critique, Allen, in a discussion of Bruno Latour's work, notes that,

When the emphasis switches to the substance of the connections, not the fact of them or their extension, then it becomes possible to think about networked relationships as mutable and shifting in line with the ability of actors to make themselves more or less present in the 'here' and 'now'. (2011a, 289)

Within the context of infectious agents, much the same geographic imaginary has been used by Steven Hinchliffe and colleagues (including Allen) to leverage a 'borderland' rather than 'borderline' account of the 'entangled interplay of environments, hosts, pathogens and humans' (2013, 8). In refusing a diffusionist model of epidemiological spread, and acknowledging a debt to Gilles Deleuze's writing on the fold (1993), they invoke topology to conceptualise the spatial complexity of disease, born of viral mutations and reassortments:

Where the flat, well-ironed surfaces of a handkerchief stand in for a geometry of fixed distances and defined borders, the fabric, once folded, draws together threads previously held apart and vice versa. In a topological vein, weaves of cloth that were once close are now distant and, conversely, points previously at separate ends of the handkerchief are now *in contact with one another*. In much the same way, the

potential for reassortments and rearrangements make disease circumjacent; that is, a constant and proximate threat to health. A viral threat that was previously thought to be distant may suddenly turn out to be close. Significantly, the apparent absence of disease at one moment in time, in one place, is not necessarily an indication that it is not present. (Hinchliffe *et al.* 2013, 8; emphasis added)

In line with our own emphasis on ‘contact’ as the driver of ‘tactile topologies’, we concur both with Hinchliffe *et al.* and with Allen himself who earlier noted that ‘[p]ower topologies . . . come into play when the reach of actors enables them to make their presence felt in more or less powerful ways’ (2011a, 291; emphasis added). This analogy of the *hand* – ‘reach’, ‘grasp’ and ‘manipulate’ – peppers Allen’s essay on power topologies as a way of indicating both the intensity and substance of relations that ‘presence’ power. Yet touch, as a form of power and much less as a motor of topology, eludes even a sympathetic reading of Allen’s paper. For us, this glossing of touch unnecessarily restricts our understanding of that intensity and substance. And, as we go on to suggest below, touch’s elision may be the result of a lurking ocularcentrism, one that is uncritically relied on as theorists further distance their mind’s eye to cope with the spatial language of topological spaces (e.g. as ‘folded’ or ‘scrumpled’). What is more, we believe that topology in geography has yet to shake off an anthropocentrism in which spatial rearrangements are solely theorised in terms of social (as opposed to non-human) power.

Our accounting of a tactile topology begins with Deleuze and Guattari’s indebtedness to the German mathematician, Bernhard Riemann, whose invention of multiplicity they heralded as a ‘decisive event’ (1987, 482) in the path toward topology. As Louise Burchill sums up, Deleuze and Guattari’s geophilosophy in *A thousand plateaus* is predicated on a co-existence,

articulated by a system of differences that, far from being external relations defined with regard to pre-existing entities, are, on the contrary, relations constitutive of the ‘reciprocal determination’ of the singularities which occur in the space ‘like topological events’ and which compose multiplicities. (2007, 154)

Riemann’s space permits congruencies between multiplicities and such Deleuzoguattarian concepts as striated/smooth, sedentary/nomad, *Extensio/Spatium* and, important for our purposes, optic/haptic (Bonta 2009; Deleuze and Guattari 1987, 482ff.; Plotnitsky 2003). While the ‘optic’ here references an external vantage point that sorts and organises space according to a transcendent logic, haptic refers to the infinite connections – what elsewhere they refer to as a ‘space of affect’ (Deleuze and Guattari 1987, 479) – that can emerge between what might be summarily called ‘localised’ points that have their own spatio-temporal-

ities. These connections, importantly, do not rely on the projection of localised Euclidean metrics from these points. Hapticality is thus crucial to an understanding of how smooth spaces are configured, insofar as these are:

wedded to a very particular type of multiplicity: nonmetric, centered, rhizomatic multiplicities that occupy space without ‘counting’ it and can ‘be explored only by legwork.’ They do not meet the *visual condition of being observable from a point in space external to them.* (1987, 371; emphasis added)

In the absence of an over-arching spatial metric for orienting relationalities between Riemannian spaces – which are conceived of as ‘sets of vicinities’ without metrics, or a ‘pure patchwork’ – Deleuze and Guattari call attention to the ‘what’ of connections by way of ‘tactile relations’ (1987, 485). Tactility – which is a more specific term than the haptic – attends to the way in which space is ‘felt’ as a meshing and unmeshing of surfaces; in place of discrete objects positioned within four dimensions, and whose constituent parts can be similarly located *ad infinitum*, we orientate ourselves and others by way of shifting pressures that indicate a composite world of presences (and absences), textures and intensities.

Deleuze’s and Guattari’s description of the inability to observe Riemannian smooth spaces from points external, in favour of tactile relations, reinforces our view that: first, accounts of topology that rely on ‘visioning’ malleable spaces by reference to physical models (e.g. origami) may unwittingly depend on an ocularcentrism not unlike that underwriting traditional absolutist spatialities (Dixon and Jones 1998); and, second, topological accounts, even when deployed as a counter to these measured spaces and the Cartesian subjects they hail, may be deficient in the absence of attention to tactile materialities.⁸ If, as Arkady Plotnitsky adjures, we admit of no sharp-edged metric breaks in Riemannian, or smooth, space, then we must ask: how can we pursue a topological sensibility predicated on contact as a ‘tactile relation’ (2003, 102) – bearing in mind that tactility (touch and being touched) are enrolled in this broader understanding of the haptic?

The answer, for us, is to turn to the distributed touch of Irigaray’s visceral philosophy.⁹ As has been noted elsewhere (for example, Colls 2011; Paterson 2007, Chapter 8; Rose 2005; Straughan 2010), her articulation of bodies as a sensuous ‘bathing’ in affect (Irigaray 2002, 74) precludes not only an understanding of the haptic as pertaining to an individualised corporeality, but also an ocularcentrism at work in prevailing, sensuous accounts of the relations between and among purported subjects and objects. Working through the phenomenology of Merleau-Ponty, Irigaray’s specular economy (1985) makes the argument that the binary

modes of thought that naturalise notions of mind/body, interior/exterior and self/other, are in turn the product, to a large degree, of a prevailing oculo-centrism.¹⁰ When bodies are initially conceived of as sighted objects, she argues, there is then an accompanying tendency to understand them as discrete. What is more, this is an oculo-centrism that tends to frame touch as simply a matter of bringing these discrete, sharp-edged entities (bodies) into contact.

Scholars of a more-than-human touch have explored this issue further, noting how, for example, distinctions pertaining to the pathic (or a feeling of affect) as opposed to the gnostic (a directed feeling) have emerged and with what import (Dixon and Straughan 2010; Paterson 2007; Straughan 2012). The gnostic is associated with a touch that analyses, and anatomises, and which is guided by an intellectual knowing. The gnostic touch tends to objectify or separate the subject from her own body, but also, despite the presence of physical contact, to establish a 'distance' between the one who touches and that which is touched. A tendency within this work has been to recover the significance of the pathic, insofar as the body allows for the generation of all kinds of knowledge, only some of which can be 'captured' through representational forms (Harrison 2000). In similar vein, everyday touch, particularly in Western cultures according to Kevin Hetherington (2003), has been devalued as a more proximal form of knowledge than a distal one, a distinction that loosely follows that between the pathic and the gnostic. A proximal knowledge generated via touch is performative rather than representational, he argues, and its 'non-representational quality is also context-specific, fragmentary, and often mundane' (2003, 1934). More often than not it is a distal knowledge, associated with the penetrating gaze, that is valued insofar as it asserts 'a broad, detached understanding based on knowledge at a distance or on a concern for the big picture' (2003, 1934).

The importance of the distinction between distal and proximal knowledge – and more specifically between gnostic and pathic forms – is highlighted in ways that speak to *Contagion's* outbreak by Nicole Shukin (2011) in her examination of zoonotic disease and the techniques of biosecurity. For Shukin, unreflective pathic sense-making by humans – or, to be more precise, an irresponsible biocitizenship – is rendered animalistic in such contexts, insofar as it can propagate co-mingled viral matter. State apparatuses tasked with managing the spread of infection work to bring precognitive, pathic touches into the realm of representational, gnostic forms ('Don't touch anyone', the film poster for *Contagion* warns). Small wonder, then, that pathic touch becomes pathologised in the name of national security. Technologies such as hand sanitisers proliferate within 'hot zones' (such as supermarkets and

hospitals) because of the diversity of their bio-matter and the heightened potential for co-mingled flesh. What is more, Shukin argues, there is a valorising of the knowing hand, working in concert with the brain, as the sovereign location for this gnostic, subject-centred, self-aware touch. This has proceeded alongside the rendering of other forms of touching, such as tonguing, as animalistic¹¹; these *outré* touches operate outside of a gnostic touch, which, together with the illuminating gaze, become the tactile foundations for biosecurity.

Importantly, this post-human line of inquiry has emphasised that the operation of the eye need not be framed as a matter of a (gnostic, distal) oculo-centrism. The conceptual issues surrounding touch – such as its distributed character – have been brought to bear in a re-imagining of how vision works. '[W]e might conceive of vision', writes feminist philosopher Iris Young, 'that is less a gaze, distanced from and mastering its object, than an immersion in light and colour' (1994, 204). For Irigaray, there is an always already *tangible-ness* that not only enables but precedes the gaze, for vision itself relies on touch:

And it remains that I only see by the touch of the light and my eyes are situated in my body. I am touched and enveloped by the felt before seeing it ... With regard to the movement of my eyes, they do not take place uniquely within the visible universe: they also happen in the living crypt of my body and my flesh. (2004, 138; see also Paterson 2004)¹²

Such a visceral philosophy helps to 'ground' a tactile topology, we want to argue, wherein the singular event, and the non-substitutability of matter is assured not in spite of, but through, the connections between and among flesh, objects and viral life. This is a 'counter-topography', to be sure, insofar as such a topology is in part defined by its capacity to dissolve boundaries, to make proximate that which was far away, and, in doing so, not only rearrange our meta-physics of intimacy and distance, but also endanger any and all systems of order that rely upon distinction and separation. Here, bodies are an assemblage of materials that are rendered distinct from each other by virtue of their capacity to do particular things (Ruddick 2010). And hence, difference ensues from what a particular body can do rather than by virtue of, for example, taxonomies based on appearance, reproductive function or DNA (perhaps 'touch' is an answer to Spinoza's famous question – 'What can a body do?'). As numerous geographers have pointed out (for a review see Dixon *et al.* 2012), we can thus talk of bodies as composed of individuals acting in concert with inhuman elements, non-human animals and technologies, all of which undertake certain practices. We can also talk of a multitude of bodies extending in and through that which we consider to be a corporeal form – including, for example, the

viral infection that extends from animal reservoir to human host to fomite and so on – such that instead of a body's interior, surface and exterior we can think instead of the matter of windows, portals and passages (Dixon and Straughan 2010).

To such an account, we must add that these are not always but are quite often mobile bodies and objects. It would be an error to approach these with an unfettered spatial imaginary of flow and fluidity. Touch, interestingly enough, averts such detachment by definition. What cannot be denied, of course, is that bodies and objects move at different speeds (and in different directions), a fact, as we now will show, that is all too apparent to the public health professionals of *Contagion*, who stand witness to the uneven velocities and intensities of microbe, market and media.

Pathologising touch in *Contagion*

The film opens not with a screen of light and shadow, but with the sound of a cough played over blackness. The cough invokes an embodied knowledge of mucus being expelled and splattered, of the hand moving in front of the mouth, and of the intangible 'feel' of another's spittle penetrating one's own corporeality through the holes in the head.¹³ Such irruptive power of epidemic disease, forcing us to rethink both bodily and social boundaries, drives much of *Contagion's* plotting, so much so that one might be justified in concluding that Soderbergh had read Braun (2008) on the topological.

A key part *Contagion's* epidemiological narrative is the search for spatial origins; that is, the 'ground zero' at which the 'jump' from animal to 'index patient' occurred. This search (which is never resolved for the protagonists) is spliced time and again with numerous parallel threads, including: (a) biosecurity agents at first finding it difficult to convince a public desensitised to warnings as a result of their experience with SARS; (b) the breakdown in that same public's level of social cohesion as the virus and media reports spread; (c) the rapid proliferation of various knowledges concerning the nature of the virus through 'networked' social media; (d) the efforts of a husband (Matt Damon) and his daughter to cope with the death of the first US victim (Gwyneth Paltrow), on her return to Minneapolis from Hong Kong; (e) the rapid mobilisation of the medical and biosecurity apparatuses at state, national (Homeland Security and the Atlanta-based Centers for Disease Control and Prevention) and international (World Health Organization) levels; and (f) the efforts of some to either obtain the vaccine outside of sanctioned channels or to capitalise on the widespread fear and mayhem by promoting a bogus remedy. The virus is eventually arrested by the halting, uneven dissemination of an attenuated (live) vaccine within the

bodies of its hosts, and the virus is symbolically immobilised – placed in stasis – near the end of the film. As MEV-1 descends into the icy depths of a well-guarded storage container, we see it form yet another stratum – a pathogenic palimpsest – that overlays SARS, H1N1 and so on.

It is only with the closing montage of *Contagion* that the audience grasps the crucial moments of virus transformation and movement. Deferred to this endpoint in filmic space-time, the origin-to-human spread of the MEV-1 is certainly revelatory, in the sense that it finally provides the audience with a biologically plausible answer as to how such a pathological entity can 'jump' from an animal to a human reservoir. Yet these depictions of the early passages of MEV-1 are not narrated from the perspective (i.e. point of view, or POV) of a human subject, but come as a series of 'cuts' spliced together: a bulldozer upends trees and rocks, a bat colony is displaced, a single bat reaches for a banana and takes refuge in a piggery, wherein it drops a part of the banana onto the floor, at which point a pig eats the banana and is later transported to market, after which its fresh meat is prepped in a Hong Kong restaurant and a woman shakes the chef's unwashed hand. By this point in the film the audience is all too aware of the invisible pathogen that has mutated alongside each of these scenes. While we are well able to predict an increasing risk of disease that comes from the displacement of 'wild' nature, the emergence of MEV-1 comes across in this montage as an autonomous production: it is an assemblage of materials and forces that comes to take the form of an infection. As Roger Ebert observed in his review of the film,

a virus is a life form evolved to seek out new hosts — as it must to survive, because its carriers die, and it must always stay one jump ahead of death. In a sense, it is an alien species, and this is a movie about an invasion from inner space. (2011, np)

Among other spatialities animating *Contagion* is a traditional, epidemiological model of diffusion. This metric space is overrun time and again by the contingent irruption of the disease in human hosts, and a good deal of the panic manifest in the film arises from an awareness of the possible 'nearness' of the virus. On screen, we glimpse the visual repertoire of such models – cartographies of infected spaces – but these remain in the background, and are never directly analysed by the protagonists (Figure 1).

While at one moment these familiar planar visualisations attest to the state's reliance on what Deleuze and Guattari (1987) call striated space, at another they betray the discussions and decisions of the officials who gather around them, for they are depicted in the film as being all too aware of intimate sites of passage: the restaurant serving infected meat, the hotel room where



Figure 1 Screen-capture of city map of disease spread, from *Contagion*

one adulterer meets another, the laboratory whose workers methodically search for a vaccine, the make-shift quarantine where the state sends people to die.¹⁴ Such sites, Deleuze and Guattari might offer in this context, are the ‘space[s] of contact, of small tactile or manual actions of contact, rather than a visual space’ (1987, 371). Topologically speaking, the spaces depicted in *Contagion* are at once singular and mobile – this is an immanent geography of dynamic sites (Woodward *et al.* 2010 2012) and their tactile surfaces. They emerge in the cuts that weave together the narrative threads, as illustrated above, but also in a dialogue that repeatedly calls out newly infected spaces, and, importantly for us in light of the preceding discussion of the ‘feeling’ of sight (as opposed to an ocularcentrism), by way of the lingering touch of the camera on infected objects.

Indeed, *Contagion*’s most interesting feature derives from its camerawork. Yes, the MEV-1 virus has devastating consequences because of the high fatality rates accompanying human infection. But as a ‘viral-horror’ story (Wald 2008), there is little discernible effort in *Contagion* to make the virus itself ‘alluring’ to the audience or the on-screen protagonists – that is, to have it imply more than it appears to be, or to hint at occult mysteries. To paraphrase Graham Harman (2010, 137), a thing becomes alluring when it seems to wield a ghostly power that exceeds its given list of properties and capacities. This demonic energy sundered the thing from its environment, just as metaphor slides the signifier away from the signified. On-screen, we do see several computer-generated visualisations of the virus. But there are no hidden depths in these images, unlike, say, the pulsating, alien mass that is eventually revealed as *The Andromeda Strain* (1971). Instead, computer visualisations present us with the *propinquity* of different species – as when a DNA analysis of the virus reveals fragments of pig and bat sequences. Or, when Dr Ally Hextall (Jennifer Ehle) explains the

propinquity of human and non-human material to Cheever (Figure 2) thus:

Here is a model of the virus and how it attaches to its host. The blue is the virus and the gold is human and the red is the viral attachment protein and the green is its receptor in the human cells. These receptors are found in the cells of both the respiratory tract and the central nervous system, and the virus attaches to the cell like a key slipping into a lock. Somewhere in the world the wrong pig met up with the wrong bat.

But the everyday objects that become fomites – that is, that become infectious agents when touched or breathed upon, such that respiratory droplets or throat and nasal secretions pass the virus from one host to the next – *do* become alluring objects of fascination and repulsion. These continually punctuate the narrative as our gaze, and that of the film’s protagonists, lingers just a tad too long on them. We have a succession of these moments in a café scene as virologist Professor Ian Sussman (Elliot Gould), who has just succeeded in growing the virus in a culture under rigorous laboratory conditions (a prerequisite to developing and testing vaccines), comes visibly to a more corporeal awareness of the virus as potentially inhabiting the space around him. The café’s objects appear to lie placidly under our eyes and under our fingertips, holding themselves in readiness for our use (Figure 3). And yet, as potential sources of infection, they also become a potent threat, ready and waiting to insert, invisibly and without fanfare, an almost certainly fatal life-form into our very flesh.

Contagion has scores of similar close-up shots in which bodies and objects touch and are being touched, as MEV-1’s hosts travel within and between cities, leaving their infected mucus, sweat and oils on all number of objects. At each point of connection, tactile presences are constantly mobilised into yet another epicentre. Both slick and textured surfaces are crucial points of passage, as the virus spreads from mouth to hand to object and back again (Figure 4), but so too are

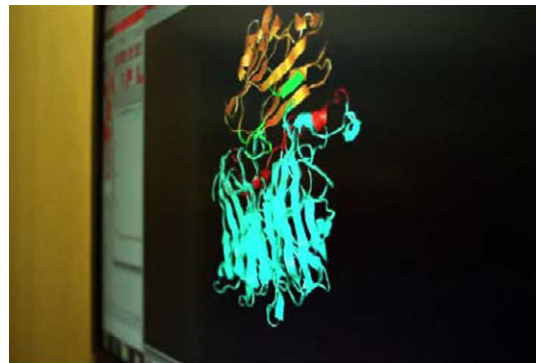


Figure 2 Screen-capture of the MEV-1 virus as it attaches to a human host, from *Contagion*



Figure 3 Screen-capture of eating utensils as fomites, from *Contagion*



Figure 5 Screen-capture of human host, from *Contagion*



Figure 4 Screen-capture of an escalator hold, from *Contagion*



Figure 6 Screen-capture of a bathroom hand dryer, from *Contagion*

the propellant bursts of air, filled with droplets, that emerge from human hosts (Figure 5) and appliances (Figure 6).

Contagion provides us a corpus of touch: on bodies human and non-human, and on the spaces these create, occupy and traverse. And, it is this sustained focus on touch that mobilises a particular series of affects, most notably 'felt' when the screen has flickered off, and the audience has stood up to leave the cinema. Bodies are leveraged out of seats and directed to the exit where light now filters in, allowing the eye to focus on the handle. It is there to be grasped, but the audience is now very much aware that the metal meeting the flesh of the hand has been touched by many other hands, each of which has in turn touched many mouths. As one reviewer remarked,

You're likely to think twice about grabbing the theater-door handle on your way out, and I can confess that one viewer found himself wondering whether he did, in fact, feel a disconcerting tightness in his throat. (Wickman 2011, np)

'What *Psycho* did for showers,' another critic warns, '*Contagion* aims to do for shaking hands and shared water glasses' (O'Sullivan 2011, np).

In dwelling upon such objects, *Contagion* draws us into the intimate, affective space of the micro, teeming with life and demonic energy, of which we partake through touch. To touch in this environment is to position the skin not as a surficial, or exterior, container to the flesh, but as a porous membrane, producing its own complex geographies fuelled by a world of distributed objects and the two to three *thousand* hand-to-face touches we make each day. It is through touch that the body becomes vulnerable to the potentially pathological and not-so-distant other – putting us at constant risk of being penetrated, invaded and over-run by the micro's ever-proliferating inhabitants.

Conclusion

Whatever advances may have emerged from topology's new vocabulary for 'cross-cutting arrangements of power' (Allen 2011a, 292), its formulations have tended to overlook tactility, and with this the material complexities of teeming life in the micro. What accounts for this attenuated status of topological thinking in geography? One answer, we believe, can be glimpsed by considering the widely acknowledged

confusion over the ontological status of a handful of geographic concepts, such as territory (e.g. Elden 2010), regions (e.g. Amin 2004), networks (e.g. Law and Mol 2001) and scale (e.g. Marston *et al.* 2005). Unfortunately, the methodological framings that such imaginaries seduce – namely, that there are social processes ‘out there’ that are manifest *as such*, and that these concept-spaces are given to the Kantian observer – have not been fully dismantled. As a result, the terms continue to circulate as ontological bedrock (Jessop *et al.* 2008). Topology, we believe, is susceptible to a similar critique. As a heuristic figuration developed to replace worn geographic imaginations, it does help supply a new lexicon (Allen 2011a; Amin 2007). But we should be suspicious of the conjuring it invites: twisted geographies *in space*, *observed* by knowing subjects. Such a mind’s eye will tend to gloss both human and non-human tactilities and the swarming micros that pass between and among them. There are exceptions, to be sure (e.g. Braun 2008; Gregory 2004; Hinchliffe 2013; Whatmore 2002). Generally speaking, however, our collective development of topology has not been sufficiently mobilised to understand, say, the ethico-politics of intimacy or the corporeal vulnerabilities produced by irruptive, non-human life forms. Much of this can be remedied, we believe, by opening lines of engagement with feminist philosophers meditating on the topological spaces of Deleuze and Guattari, some of whom have already proceeded to map out the role of topology in the micro, from electrons to nomadic subjects (Barad 2001 2003 2007; Braidotti 1994; Giffney and Hird 2008; Shukin 2011).

Over and against the bordered logics of territory, networks and scales, the ‘microlocalities’ (micro space cum political potentials) of touch point to the always-already openness of permeability and porosity as the distinctions between ‘out there’, ‘on that’ and ‘in me’ begin to dissolve with touch. In the process, a tactile ontology – or tactile topology – bypasses, we hope, numerous uncritical accounts of the micro: as something at the opposite of a scalar continuum prioritised by the macro; as a unit of measurement (micron) that cordons off the tiniest of objects; or as simply a constituent part of the world revealed through gaze-enhancing technologies (microbes through microscopes). By contrast, what we might term *Contagion*’s ‘virus-eye touch’ (to rework Stevensen’s [2011] ‘virus-eye view’¹⁵), repeatedly suggests an ‘always within reach’ geography that invites reflection on a tactile topology democratically inclusive of both objects and bodies, including microbial ones (Hawkins and Straughan 2014).

A way forward in this effort can be pointed to by ‘fleshing out’ site-based ontologies (Jones *et al.* 2007; Woodward *et al.* 2010), the first step of which can be found in Woodward *et al.*’s (2012, 211) concept of

‘matter-processing’, wherein the selection and actualisation of matter’s potentials of differentiation, which are both immanent and autonomously self-legislating, are stabilised as ‘sites’, only to be dynamically reconfigured and disrupted *as part of* new differentiations. In two ways, site ontology rejects the lure of thinking that puts topological objects *in space*, *for* observers: first, because the forces of differentiation are immanent and thus not solvable by logics transcendent to them, and second because these differentiations exceed subject-mastery’s reflexive immersion in representationalism (Woodward *et al.* 2012, 211–12). Placing touch – along with the other senses – into this non-subject-centred ontology will require close attention to the ‘differential orderings of and access to life’ and more specifically to ‘the differential renderings of a corporeal vulnerability and obduracy’ (Dixon 2014, 139). Whether and how this might help reconfigure topological spaces is an open question, but prior to knowing the contours of an answer, we must know something about the differential materialities and forces that might produce them. Therein lies the problematic field of topology.

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Notes

- 1 The film rewrites the analytic terrain, for example, of William McNeill’s (1976) epochal *Plague and peoples*, which dwells on the co-organisation of epidemiological threat alongside pivotal geopolitical, social and economic developments; Laurie Garrett’s (1994) *The coming plague*, which correlates the modern-day resurgence of epidemic disease, as well as the emergence of new forms, with international travel, migration and urban development; and Nathan Wolfe’s (2011) *Viral storm*, which posits an increasingly globalised world as a zoonotic disease incubator. All look to the co-mingling of organisms and an ensuing bio-vulnerability among ever-more connected, or ‘in touch’, populations.
- 2 According to W. Ian Lipkin, a professor of epidemiology at Columbia University’s Mailman School of Public Health and a scientific advisor to the movie’s screenwriter,

The science is really very good ... We took sequences of known viruses and we modeled them and morphed them into this new virus, but everything you see is biologically plausible. (Krisberg 2011, np)

- 3 Wang, head of the emerging virus research team at the CSIRO Australian Animal Health Laboratory that discovered the zoonotic virus on which MEV-1 is based, observed:
- About 50 of our staff went to see the film ... We were very excited to see our work in the movie. What happens in the film is similar to what happened to us, for example, how we developed diagnostics and special bat cell lines to grow the virus. (Wang, cited in WHO 2011, np)
- 4 As Anna Secor summarises,
- Topologically speaking, a space is not defined by the distances between points that characterize it when it is in a fixed state but rather by the characteristics that it maintains in the process of distortion and transformation (bending, stretching, and squeezing but not breaking). Topology deals with surfaces and their properties, their boundedness, orientability, decomposition, and connectivity – that is, sets of properties that retain their relationships under processes of transformation. (2013, 431)
- 5 Though inspired by the work of the French mathematician Henri Poincaré, who was instrumental in the development of topology, Jones (2009) instead deploys the thinker's contributions to 'phase space' to develop a spatial ontology that attends to the 'spacetime' conditions, or context, that afford a degree of inertia to the governance of a territory.
- 6 Note as well that across the geographic literature on topological thinking, we can track a borrowing from mathematics; more often than not, however, this work is introduced via the mediations of Gilles Deleuze, and particularly his work on the fold (1993). Here, the fold is an operative function that does not rely on centres and margins but on twists and turns ad infinitum that turn outsides into insides and vice versa. Such folds are no mere decoration; they are the expression of forces that turn objects 'upside down or to stand or raise it up over and again, but in every event to turn it inside out and to mold its inner surfaces' (Deleuze 1993, 122). Doors, windows, portals and frames are no longer signs of passage between one location and the next, but are themselves subsumed by an overflowing materiality; the spaces they forbear to contain reach beyond again and again, bringing into collision blocs of sensation.
- 7 Coleman (2011) makes the point about the need to underwrite topology with an underlying ontology via reference to the flat, or 'site', ontology that Sallie Marston, John Paul Jones III and Keith Woodward offer as a substitute for scalar imaginaries (Jones *et al.* 2007; Marston *et al.* 2005; Woodward *et al.* 2010).
- 8 Anna Secor's (2013) account of topology as put forth by Lacan also aims to avoid these problems by moving beyond perceived spaces and by interweaving the city and subject. As she puts it,
- what the Lacanian perspective brings to the table is a way of thinking about the relationship between the subject and the site – or city – that directs us to their co-constitution... To be clear, the city in this argument is not simply 'subjective,' something that each person has his/her own version of. It is not simply a projection of the subject any more, as the subject is merely an introjection of the city... [F]rom a psychoanalytic perspective, one could say that the city and the subject are distributed and
- splayed out, a Möbius surface that encircles its own limit. (2013, 439–40)
- 9 In drawing the visceral philosophies of Irigaray and Deleuze together (with, sometimes, Guattari), we do not wish to imply that they correspond precisely. Irigaray's insistence on recognising a feminine other, and a sexuated personal identity, for example, does not sit easily with Deleuze's detailing of the pre-personal singularities of life. Yet, both, as Tamsin Lorraine (1999, 8) points out, are working within a French philosophical tradition 'marked by the Cartesian influence', and are concerned with Nietzsche's distinctions between the little and larger 'self'. Both question the coherence and solidity of bodies, proffering instead an affective materiality of existence.
- 10 In this, Irigaray's work (1985, 1992, 2002, 2004) resonates with Rosen's (2006) topologies of the flesh, which also deploys phenomenology to eschew a Kantian framing of bodies. Yet where Rosen uses topology as a guide to the intricacies of a fleshy human body, Irigaray brings forward the matter of contact between bodies, which we see as essential to our reworking of topological accounts in geography.
- 11 Shukin illustrates the distinction above through a cultural analysis of the uproar that was generated over images of humans mouth-to-mouth with piglets.
- 12 Appropriately enough in the context of our discussion of *Contagion*, this tangible porosity is exemplified by mucus, which, Irigaray argues, represents the melding as well as the interface between toucher and touched. She writes,
- Nor will I ever see the mucous, that most intimate interior of my flesh, neither the touch of the outside of the skin of my fingers nor the perception of the inside of these same fingers, but another threshold of the passage from outside to inside, from inside to outside, between inside and outside, between outside and inside: I will always feel veiled, unveiled, violated, often by the other in this dimension which I cannot protect with my look. These mucous membranes evade my mastery, just as my face does, yet differently. The joined hands, not those that take hold one of the other, grasp each other, but the hands that touch without taking hold – like the lips. The joined hands perhaps represent this memory of the intimacy of the mucous. (2004, 142)
- 13 Bearing in mind the preceding argument regarding the hapticality of sight, we would be remiss not to intimate something of the pathic touch of *Contagion*. The scenic visceralities are evident even in blackness. As one critic averred, 'Try not to cough in the cinema while watching this – you might just empty the place' (Jolin 2011, np). Nonetheless, in using *Contagion* as an exemplar, we find ourselves adopting more of a gnostic gaze that points to particular moments in which touch propels the narrative. For more on hapticality in film, see Deleuze's *Cinema* (1989).
- 14 Yes, the CDC can map clusters, but they are more often shown as knowing agents of spaces intensive as well as extensive, as this excerpt attests:
- Cheever (driving, talking on phone): WHO has confirmed that the Hong Kong sample matches London, Tokyo and Abu Dhabi, we're seeing large clusters in from Frankfurt and Cairo.

Dr. Erin Mears (Kate Winslet): Are we any closer to an index patient?

Cheever: Could be your Beth Emoff [Gwyneth Paltrow] or your guy on the bus in Japan, [or] someone else who crawled off the grid.

- 15 Stevenson notes that, from a virus perspective, human hosts are ‘a concatenation of infectable surfaces, a multiplication of interfaces beyond anything technology can immediately envisage in response’ (2011, np).

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