



**Paul Richards**, *Ebola: How a People's Science Helped End an Epidemic*, London: Zed Books, 2016. ISBN: 9781783608591 (cloth); ISBN: 9781783608584; ISBN: 9781783608614 (ebook)

### **Black Mirror: Did Neoliberal Epidemiology Impose Its Image Upon Ebola's Epicenter?**

Can there be madness in mathematics? Are there crazy people who think that two and two make three? In other terms, can hallucination—if only these words do not shriek aloud, at being coupled together!—can hallucination invade the spheres of pure reason?

—Charles Baudelaire (1856)

A people who free themselves from foreign domination will not be culturally free unless, without underestimating the importance of positive contributions from the oppressor's culture and other cultures, they return to the upward paths of their own culture. The latter is nourished by the living reality of the environment and rejects harmful influences such as any kind of subjection to foreign cultures. We see therefore, that if imperialist domination has the vital need to practise cultural oppression, national liberation is necessarily an act of culture.

—Amilcar Cabral (1970)

If deadly infections strike the fear of God in us—a trope to which we will return—it is in part because they operate at levels of organization beyond our daily experience. Pathogens are typically too tiny to see and the epidemic waves by which they arrive too large. The physics of disease wave and particle are largely invisible to our routine social practices. Even our present-day bellwethers, animated by the very best of modern science, are a house divided. Hospitals are eating away at their own proprioception, increasingly confounding the information the market processes—quarterly margins and medical bills paid—with epidemiological inference (Mirowski 2009, 2015; Waitzkin 2018).

Historically, a disease's shadow could be observed upon many another of a polity's cave walls. To some, birds of omen signaled a spike in dead bodies a village over (Cohn 2008; Marr and Calisher 2003). To others, the sick suffered animistic possession, infected by a life cycle

undergoing its own birth by contraction, reproduction by transmission, and death by immunal clearance or in its host's own demise (Freed and Freed 1990; Hughes 1951; Wallace 2004, 2016a). With infectious disease the prime source of mortality through most of human history, pathogens appear a major impetus for the emergence of the modern state and its institutions, the latter as much, as agroecologist Jahi Chappell (2018) puts it, the stuff of sci-fi fantasy for our prehistoric ancestors as smart phones or landing a robot on an asteroid (see also Wolfe et al. 2007).

Historian Sheldon Watts (1997) writes of this new "tech" in medieval Europe:

In northern and central Italy, during this era the part of Europe where most innovative thinking arose, elite ideas underwent a transformation around 1439-50. To still new notions of health as *publica utilitas* were added intellectual stimuli brought in from Ottoman-threatened Byzantium ... Several Byzantine scholars stayed in Florence, greatly increasing the number of people in the West who could translate ancient medical works from Greek and Arabic into Latin ...

Emerging from this complex of perceptions [that society was an organism and poor people carriers of plague] was an Ideology of Order which during the epidemic crises justified intervention into the lives of ordinary people. First created in Florence and its sister city states by humanist scholars, jurists and health magistrates (who were usually *not* university-trained physicians), the order ideology gradually spread to France and Spain ...

The embryonic population health of Foucaultian migration control, quarantines, and outbreak pantries also modernized expedient discrimination: Jews at the stake yesterday, the four H's—heroin addicts, homosexuals, hemophiliacs, and Haitians—upon HIV/AIDS's late 20<sup>th</sup> century pandemicity (Grmek 1990; Spinney 2017). The reverse reification from things to people acts both a wistful anthropomorphism making disease a party with which we might negotiate detente and a bludgeon upon deviations of a usefully arbitrary norm.

Epidemiologists, our motherboard shamans, have mathematized this ontological gap between object and subject, between spectral disease and the very real people endangered. By a

system of differential equations showing changes in disease populations over time, to be read in comic Gilbert Gottfried's cantoral wail:

$$\frac{dS}{dt} = \Lambda - \mu S - \beta IS$$

$$\frac{dI}{dt} = \beta IS - (\gamma + \mu)I$$

$$\frac{dR}{dt} = \gamma I - \mu R,$$

where  $S$  is the population of susceptibles,  $I$  the infecteds,  $R$  those who have recovered from infection,  $\Lambda$  the birth rate,  $\mu$  the death rate,  $\beta$  the infection rate, and  $\gamma$  the recovery rate (Dieckmann et al. 2005; Kurath and Wargo 2016). The basic reproductive number  $R_0$  ("R-naught") offers a threshold measure of the force of such an infection burning through a susceptible population:

$$R_0 = \frac{\beta \Lambda}{\mu(\mu + \gamma)} .$$

An  $R_0$  over 1—with some combination of high transmission and host birth rates and low host death and recovery rates—and the infection spreads. Below 1, with not enough susceptible "food" to feast on to keep transmission apace, and the outbreak burns out.

Such susceptible-infected-recovered models can capture something of the broader dynamics churning beyond our senses, including, at the population level, the mutually deterministic impositions between those infected and those not. The magic of SIR can be found in more than in irradiating disease's spooky action at a distance. Evolutionary epidemiologists

take deep personal satisfaction in finding contradictory expectations and perverse outcomes across these capacious parameter spaces.

In one such wrinkle, for an alternate measure of the basic reproductive number,

$$R_0 = \frac{\beta(v)N}{\delta + v + c(v)},$$

virulence  $v$ , the damage a pathogen causes its hosts as an evolved characteristic, may depend on more than just the rate of infection  $\beta$ , as much of the modeling literature presumes. Just the size of the population  $N$  is enough to drive the evolution of greater virulence, a damning conclusion for any agribusiness monoculture processing millions of poultry every six weeks year-round (Atkins et al. 2010; Lipsitch and Nowak 1995; Wallace 2016b). With all that food for bird flu and other pathogens, the deadliest strains beat out less virulent competitors at little evolutionary cost whatever the company margins dedicated to biosecurity protocols. Other models show upon an outbreak on such a farm, increasing the culling rate at which infected and threatened poultry are removed *decreases* the prevalent level of host immune resistance, leading to *greater* susceptibility to future outbreaks (Shim and Galvani 2009).

But two complications derail our medicine mathematicians. First, we need ask, what do we lose to the ghost in the inferential machine? Rare among commentators in his candor, geographer Peter Gould (1993) unpacked the differential paradigm as a rank failure:

The journals are flooded with one variation on the basic theme after another, all of them equally pretentious and unilluminating. We even have the ridiculous sight of anthropologists wandering around East Africa with their differential equations hoping to estimate transmission coefficients between sub-groups in the midst of a region where whole villages are being abandoned, hoping to “calibrate” their still purely temporal equations. The epitome, the ultimate folly of this approach came in a paper modeling the diffusion of the HIV in the whole of New York City horizon. Geographically, of course, New York was homogenized and compressed to the head of a pin, simply because there was no need to consider any difference between the burnt-out Bronx and the trim lawn suburbs, or people in the packed tenement houses

of a Harlem slum and the residents of apartments overlooking Central Park. After all, people are people, and since we are only playing computer games anyway, we can lump them together.

To be sure, SIR and its cousins among the cellular automata can be *spatialized*. A “critical connectivity” for instance selects for virulent strains that can now invade isolated host populations in which only less deadly strains could previously survive the limited supply of susceptibles (Messinger and Ostling 2009). The *geography*, on the other hand, as Gould describes, with all the depraved expropriation found up and down many a landscape, uneven scars badly healed or open cancers oozing up from soils real and proverbial, is omitted as if a matter of principle.

Other approaches suffer related deficits. The preponderance of cost-benefit analyses of disease intervention is organized around an ethics of economism protecting state budgets and corporate margins first rather than the communities at which such interventions are purported to be aimed (Wallace et al. 2018). Almost no effort in that literature addresses the structural pillaging that produces the artificial scarcities these analyses ostensibly track.

Our problems here, then, are more than mere matters of technical complication. There is a deeply social component to such eldritch derivations. One need be neither Ludwig Wittgenstein nor an ethnomathematician to reject philosopher Slavoj Žižek’s Lacanianism that sinthomes, the deeper *jouis-sens* of meaning at the heart of the materiality of the written word, qualitatively differ from mathemes, their mathematical analogs (see Ascher 2017; Powell and Frankenstein 1997; Wittgenstein 2014; Žižek 2012). For mathemes also carry libidinal investment and are also subjectivized not only along historical trajectories long and short but by deeply personal *jouissance*.

That doesn’t spoil the mathematics. It just makes it part of the fabric of human experience. However useful projecting disease dynamics at the population level, the formalisms on which many such analyses are based are themselves just as entrained into the codified myopia of dominant epistemes as any other language. Technicians in public health, as quants on Wall

Street, can be maneuvered grant by grant, policy by policy, into deriving kleptocratic presuppositions after the fact (Bettez 2013).

Understanding disease, then, as cultural anthropologist Paul Richards (2016) proposes in his recent book on the Ebola outbreak in West Africa, can be projected as if in a mirror. What's investigated is expected to mimic its investigators.

### **Treatment as Metaphor**

The Makona variant of Ebola emerged December 2013 outside the village of Meliandou in the Guinea Forest Region. The virus would infect as many as 35,000 people, killing 11,000, across Guinea, Liberia, and Sierra Leone. Unlike previous outbreaks strafing the odd forest village in Central and East Africa, this one—by a virus that at outbreak's start appeared genetically little different from its predecessors, its case fatality rate, incubation period, and serial interval archetypal—left bodies in the streets of capital cities a plane ride away from the rest of the world (WHO Ebola Response Team 2014).

At 150 pages before endnotes and references, Richards's book is a concise recitation of the episode. Clinical course, transmission routes, geography, and interventions are dispatched in short order. The book, however, is no mere summary. Richards aims to integrate high concepts and grounded protocol in an effort to *apply* medical anthropology in what for the discipline borders on real time. Even readers long ensconced in Ebola particulars will find themselves exposed to many a newly harnessed idea, however long in the tooth the latter, some as old as the origins of modern anthropology. Think medical thriller, that dross of airport bookstores, gratefully plagued by rich intellectual retcon.

To make a short story shorter, Richards argues the response to the Ebola outbreak was botched because epidemiologists and international public health officials attempted to impose their model of the outbreak onto interventions aimed at blocking transmission. Whatever their ingenious intuitions, the marvels of medical and mathematical inference, instantiated by the system of simultaneous equations with which we began our review, can rationalize interventions with exactly the contrary impact promised. In Ebola's case, infection spreads when friends and

family care for living patients and bury their still infectious dead. So patients must be taken care of by trained professionals and village burials brought to a halt in favor of body bags thrown in a common grave. The modeling, then, makes the societies epidemiologists parachute into in the latter's own image. Another in a long history of parlaying colonial medicine into African ontology, with the not unprecedented effect of exacerbating an outbreak (Bagnato 2017; Benton 2015; Vaughan 1991).

The World Health Organization model of intervention, Richards writes, boxes up an Ebola outbreak in a hexagon: virus identification, extraction of patients, quarantines, safe nursing, contact tracing, and safe burial. Health ministries bled by structural adjustment programs that helped bring about the epidemic in the first place, a context Richards largely misses, must make way for an international response increasingly hindered by a reliance upon philanthropists. Private contributions supply 80% of WHO's budget, moving the organization's priorities from global health to monetizable illnesses (Fortner and Park 2017). Polio in place of measles, for instance.

The resulting late start on the Ebola outbreak, the public health tanker slow to turn from its polar star over the Gates Foundation, meant mobile labs, treatment units, and medical personnel at the heart of operationalizing intervention would begin only after Ebola had breached a critical geographic threshold (Wallace 2012). The virus spreads over many multiple populations and control turns geometrically more difficult. An Ebola of a lesser virulence, less likely to break its own chain of transmission by virtue of a greedy replication that kills its host before infecting the next, would probably have expanded out of West Africa through that hole in the structural fence. Despite patting their own backs upon the outbreak's contraction, both the medical approach and the people's science Richards champions were very lucky the Makona strain's life history undercut its own still spectacular success (Dudas et al. 2017).

With international aid finally on the ground, under the SIR model, reducing transmission rate  $\beta$  would have the infected removed from villages to treatment units. Or, as Richards relays, families, with no transport to speak of, are counseled to bring their ill cross-country to these units. The sick are cared for by spacesuited internationalists and their local help, the latter often

from towns and cities other than those hit by the outbreak. The dead—bags of virus—are buried by specialists with only so much as a pat of a shovel or upon updated training a moment of silence, rather than by family and friends who would only spread subsequent infection. Affected villages are leafleted, or shouted at by loudspeakers, with for the most part accurate explanations of Ebola’s epidemiology and instructions based on expectations from abroad:

“Pay your respects [to the dead] without touching, kissing, cleaning or wrapping the body”, “Call the toll free number to arrange [for] the body to be picked up”, “the house, latrine and person’s room must be disinfected by trained staff”, “do not care for a sick person at home”, and “soiled clothing and bedding are contagious and must be burnt” ... One was to “contact your local community leader” if the toll-free pick-up call received no answer. Whether the local leader would have any clear idea about what to do, unless specifically trained, remains unsaid. (Richards 2016: 124)

Richards shines in identifying where medicalizing intervention—taking advantage of what ethnographer Johanna Crane (2013) called invaluable inequalities—short-circuits an effective response beyond the obvious practical complications in presuming Africa just a Europe to the South. Epidemiologists, for one, use fear as an ideational weapon. Villager ignorance driving the outbreak, a presumption held across the media-academic continuum, is to be batted aside by the deliberative approach of manuals and workshops, an ethos of education from which its champions personally benefited most their lives. Scientists, acting as Beauvoisite warlords, actualize themselves in their research subjects: ‘you must listen to us who produce answers and you need to choose to act as the extensions of our premises or else risk your village.’ The epidemiology here, following Žižek (2017), aims at a Lacanian symbolic injunction scientized into a hypnotic force as if by its mere enunciation.

If ideas matter, then some here are to be treated more equal than others. The social sciences, sources of an alternate or more appropriately concomitant paradigm of intervention, are left out of oft-militarized command centers as part of an inconvenient political opposition historically tasked with documenting the damage of expropriation at the heart of regional governance.



The bulk of the book, however, is spent on what such approaches—treatment as metaphor—lose out. Members of a people tied to a particular land with both a contingent and path-dependent history aren't just variables in a universalizing equation. More than merely a matter of insensitivity, medicalizing intervention by a Gray's Epidemiology can burn down the villages it claims it'll save. However competently administered, bunker-like treatment centers segregated from the community conflate hospitalization and an erasure from which the sick flee or are rescued from by relatives (Benton 2014a). Prohibiting funerals at which families wash their loved ones, not, as Richards explains, the strange ritual portrayed, but a bedrock cultural practice across Africa and beyond, encourages families to hide their dead from public health authorities:

People do not bury bodies because they want funerals. They want funerals because they have a dead body ... If it is stubborn to wash the dead then it is stubborn to nurse the sick. To insist otherwise blames the victim ... So commentators on the Ebola epidemic, whether in Australia or elsewhere, ought to avoid stigmatizing West Africans for no other reason than that they cared for their loved ones. (Richards 2016: 51)

Richards situates these common practices in sociologist Marcel Mauss's (1935) notion of "techniques of the body". The human body is deployed as our first and still most elementary of technologies. Various culture-, age-, and gender-specific modes of our embodied tool chest extend from cooking, eating, and sleeping to—more specific to debates around Ebola—washing up and handling the infected and the dead:

The observer will quickly note quite a lot of variation in the modalities of washing, dependent on local resources and preferences. Variables include location and climate, whether the water to the house or a person washes at pump or stream, whether water is heated (something reflecting the availability of labour and fuel) and (in cases of ill health) on the type of sickness (the body may need to be steamed or cooled) ...

Specific protocols and sub-routines for special body parts (for hair, eyes, teeth) will inevitably attract further attention, as will the vast array of ancillary technologies and specialist trades associated with

washing. An army of craft producers prepares calabashes, buckets, “sapo” (scrubbing materials) and soap, storage containers and drying materials, and builds shelters from the elements and screens for privacy, on and up to the plumbers and other specialists who sort out the en suite bathroom plumbing, piped water and blocked drains. (Richards 2016: 61)

The preferred routines are neither merely matters of local behavioral ecology, nor a happenstance imaginarium. They are co-produced with emotional and normative associations even into the death that does us part:

Understandably, the desire to wash the body at death seems irresistible, to wipe away the signs of life’s last struggles, and to prepare the corpse for the last journey. It is a natural reaction on the part of survivors, many of whom will have daily assisted the deceased to wash through the best part of a lifetime. It ready takes on symbolic or ritual associations. But the primary impulse is to wash the body for one last time. What could be more normal or practical? ...

Preaching against funerals (arguing that the Ebola problem is driven by a stubborn adherence to cultural norms) is potentially counterproductive, since it fails to take account of the larger social field within which funeral techniques (or cultural practices more generally) are embedded. (Richards 2016: 62)

Richards reports back his fieldwork taking inventory of such locale-specific methods in Sierra Leone. Such study needs more than merely decode suspect rituals that health officials can purge along with, by extension, the communities that practice them. As medical anthropologist Kate Mason (2016) puts it, NGO “community engagement”, to decrypt a circumlocution from the other direction, means securing “community cooperation with global priorities”. By their own program in supervised and unsupervised learning, Richards continues, local peoples are in actuality in the best position to determine how to modify washing and burial to scotch Ebola. Destroying the community, after all, if by disrupting many of its core practices, isn’t entertained as an option. If epidemiology is about stopping outbreaks first, rather than autoclaving imperialism’s back story, then liberation and self-determination are foundational interventions, however necessary—and yet still insufficient—science and public health may be:

The first outside responders [in Sierra Leone] wisely attached themselves to these local initiatives. In effect, communities had begun to think like epidemiologists, and epidemiologists (in providing timely and relevant advice to local agents) had begun to think like communities. An evidence-based people's science of Ebola control had begun to emerge. (Richards 2016: 129)

### **Stretch Marx**

The models of culture that powered the initial failures in Ebola intervention were no accident, however, and strain to be recapitulated by dint of expedient necessity. Not a bug, but a feature. Under the Liberian beach, the colonial pavement. The WHO's assumption education is the crux of the matter, Richards writes, reproduces the core conflict in anthropology whether belief causes action or the other way around. What began with Max Weber's notion capitalism emerged out of its Calvinistic context and Richard Tawney's counter-contention early capitalism selected for a particular set of religious beliefs evolved into an ongoing cage match between Weberian idealism, Marxist historical materialism, and Durkheimian demographic materialism. To which paradigm WHO adheres, Richards asserts, will affect an intervention's justification and the public health campaigns that follow.

Richards, a Durkheimian, paints the Hewletts Barry and Bonnie, who famously studied Ebola in East Africa, as expert Weberians (Hewlett and Hewlett 2008). The Hewletts, Richards recounts, claim the Acholi, like the mathematical epidemiologists with whom we began, carry about a series of mental templates from which they apply an appropriate epidemiological model and response. But from where and why such models arise, Richards points out, is unaccounted for. Without an answer, no recommendation as to how to help the indigenous arrive upon novel responses to novel diseases can be offered.

The Durkheimian model, on the other hand, views ritual as no boilerplate, Richards continues. It is conditionally generative, triggering the commitment and adaptive group action needed to beat back an outbreak. Sacred symbols may be memory aids but must be first invested with group energy in the course of action, including as Mauss's techniques of the body are

deployed. The choreography emerges from the dance itself, the model of bathing from the bath, and not the other way around.

Richards finds the potential impacts on a people's science of Ebola are foundational:

Where, then, can the kinds of performative approaches to behavioural change required to beat Ebola be rehearsed and perfected? One answer is that the capacity to effect change already exists in countries like Guinea, Sierra Leone and Liberia, through the performative skills inculcated in rural sodalities such as Poro and Sande. These can be seen as "workshops" in which dance does the work of deliberation.

The sodalities evolved as a secure and confidential retreat in which small groups could organize around common interests, when beset by many enemies in a dangerous and fluid external world. The sodalities fostered a range of disciplines—from keeping secrets, to enduring pain and hardship, to ways of testing and weeding out spies. Meaning and agreements were danced out by the group, rather than proclaimed or documented. (Richards 2016: 138-139)

Marxists, on the other hand, unlike Weberians, are just fucking idiots, their eye on the wrong ball. Ebola isn't a matter of investment in medical services, Richards argues early in the book. The virus is risky under all economic modes:

Having a better-funded treatment environment is not the answer. Treatment has to be specifically redesigned to separate Ebola patients and to protect responders at the earliest stage possible. This requires patients and responders to share ideas and beliefs appropriate to the kinds of behaviours that minimize infection risk. How this alignment of ideas, belief and behavior is to be attained is a key issue for Ebola response. (Richards 2016: 18)

Setting aside both the funding necessary to detect infection—medicine's contribution to a people's science—and Richards's apparently unselfconscious reversal on this point later in the book—resources apparently do matter—Marxists have long connected the structural molar to the social molecular (Richards 2016: 88-89; Wark 2015). The living contributions of individual people and their groups matter.

Anthropologist Maurice Godelier, for one, rejected the vulgar Althusserian distinction between base and superstructure. Ideas, however arrived upon, influence material conditions as much as in the other direction, largely, if not entirely, within a historical context. Godelier (2011: 10-11) interpolates Weber, Durkheim, and Marx this way:

No material action of human beings upon nature, by which I mean no action which is intentional and pursued of their own volition, can be executed without setting to work mental realities, representations, principles of thought which can under no circumstances be simply reduced to reflections in thought of material relations originating outside it, prior to and independently of it.

Moreover, these mental realities are not all of one and the same kind. They include, alongside representations of nature and humanity itself, representations of the aims, means, stages and anticipated results of human activities on nature and in society—representations which simultaneously organize a sequence of actions and legitimize the location and status of their agents in society. In short, there is a mental component at the core of our material relations with nature.

Marx's materialism, meanwhile, wasn't cast in labor terms alone, although one can't help but forgive the emphasis given political economy's insistent neglect. Historian Joseph Fracchia (2017) finds in Marx's elaboration upon Feuerbachian *Vergegenständlichung*—humanity's capacity for "objectification"—a Copernican shift that sought to generate the notion of reason from the body up, from "mindful bodies" rather than the traditional "embodied mind". Literary theorist Terry Eagleton (1991), as Fracchia relays, sees Marx's attempt a tough gambit, after all,

how could it safeguard itself from naturalism, biologism, sensuous empiricism, from a mechanical materialism or false transcendentalism of the body every bit as disabling as the ideologies it seeks to oppose? How can the human body, itself in part a product of history, be taken as history's source? Does not the body in such an enterprise become simply another privileged anteriority, spuriously self-grounding?

Fracchia (2017: 5) finds Marx's failure only in the monumentality of the task rather than in gutterballing an answer by a false universalism or eclectic bricolage. Indeed, to speak to Richards's mischaracterization:

To complete his corporeal turn and establish the foundation for a materialist conception of history, Marx considered more thoroughly the kinds of activity indulged in by the sensually acting human subject with its peculiarly human corporeal organization. Focusing on the entire array of human corporeal capacities, he did not limit the scope of human activity to the realm of philosophy and theology. He reflected more broadly on how human beings, in a wide range of socio-culturally specific ways act in, and *on*, thereby transforming, the world; that is, to borrow from Nelson Goodman, he reflected on human “ways of world-making”.

So, Fracchia continues, Marx’s objectifications—as a concept more leitmotif than schema, but like Darwin’s a research program still open to continued exploration—extended beyond material labor alone and into the semiotic and the social. The first entails the production and uses of signs, the second the organization of social relations, formal and informal. Both can include purposeful activity without conscious intent, the kind of dancing, to hark back to Richards’s Durkheimianism, that produces its own choreography. Still, Marx’s model, Fracchia (2017: 15) concludes, integrates but doesn’t conflate evolutionary and human histories:

*Homo sapiens* is outfitted with a unique bodily tool kit; but unlike all others, human corporeal organization houses an expansive set of corporeal capacities whose objectifications transform the world in multitudes of culturally specific ways.

A more recent Eagleton (2017: 66) expands upon this Maxwell’s Demon of a Marx, who took a stab at parsing through the social molarity molecules up:

To begin from human agency is to dismantle the distinction between subjects and objects, since practice is a material objective affair, yet one inscribed with spirit (motives, values, purposes, interpretations and so on). It is also to relax the tension between Nature and history, given that the body belongs to both spheres simultaneously. Marx points up its ambivalent status when he writes of both material and sexual production as being doubled in this respect. “The production of life,” he writes, “both of one’s own in labour and of fresh life in procreation ... appears as a double relationship.” Humanity, he observes, has “an historical

nature and a natural history”. If he refuses to collapse culture into Nature, he is aware that to collapse Nature into culture is quite a reductionist a move.

But such expansiveness is neither an end unto itself, nor genesis enough:

Marx may begin from human beings as material agents, but it is not exactly where he ends up. The later author of *Capital* continues to believe that political emancipation concerns such flesh-and-blood creatures, but it does not follow from this that one’s analysis should begin from them. In fact, *Capital* is not concerned with individuals at all. It treats them from its diagnostic purposes purely as the “bearers” of certain social and economic structure. In the light of this, it might be argued that the early Marx does not start far back enough. Simply for us to be social agents, an enormous amount of material infrastructure must already be in place. Indeed, Marx himself complains that idealist thought fails to start far back enough. One can begin with ideas, but then where do ideas come from? What must already have happened for men and women to be capable of reflection? What forces put human subjects in place? There, by and large, are no legitimate questions for those for whom consciousness constitutes an absolute origin or ground. (Eagleton 2017: 66)

The same it seems could be said of disease modeling itself. Dialectical biologist Richard Levins (1998, 2006) proposed the variables we include in our models are a social decision. What we choose to make internal or external to these models can have a significant impact on their outcomes before a single datum is collected. I’ve bent the stick so far as to suggest the resulting analyses can drive disease itself (Wallace 2016c). As sources of mortality compete, when “reductionist” diseases, their biologies the sum of their parts, respond to our models and the oft-commoditized interventions they spur, more intransigent “holistic” diseases operating across scales and biocultural domains—e.g. HIV, TB, malaria, and Ebola—can emerge uncontested in pharm and field:

In a world in which viruses and bacteria evolve in response to humanity’s multifaceted infrastructure—including our science—our epistemological and epidemiological intractabilities may be in fundamental ways

one and the same. Some pathogens evolve into population states in which we cannot easily think. (Wallace 2016c: 93)

If the Owenite halls of science are an early marker, Marxists have long championed the materialism behind modern science, often *avant la lettre* given bourgeois reluctance (Garnett 1972; Wallace 2009, 2013). At the same time, Marxists projected public health, its methods included, as a science for and by the people, beyond proximate causes alone and up into the thicket of social and environmental determinants driving population health (Muntaner and Wallace 2018).

### **Neoliberal Epidemiology**

The Marx dismissal appears one of a series of Manichean shortcuts Richards takes. It reads as if, consciously or not, he deploys these to drive epistemological rivals off the road, an honored tradition in the all-too-social sciences. Before evolutionary biologist me gathered any sense of this particular circuit of drag racing, I was vivisected the Marxist subject in Lyle Fearnley's (2013) brilliant Weberian dissertation for which I had agreed to be interviewed. No sweat whatever my objections upon a more recent reread, I learned a lot. And who are even we who unpack science as an historical object to step out of the story scot-free?

One could take such fraught contestation to a second order, as Adia Benton (2017) frames the Ebola fight into which her fellow anthropologists were recruited:

Precisely what form does relevant information take? What social and political processes allow for relevance to be packaged and delivered through the appropriate channels? Faced with a crisis, anthropologists in the room were compelled to see Relevance as an actually existing thing to pursue—highly context specific, institutionally mediated, and important to everyone—but readily and easily defined by no one. To paraphrase Nick Seaver (2015)—and Marilyn Strathern (1995) before him—the nice thing about relevance is that everyone wants to embody it.



In another such dichotomy, Richards raises medical humanitarian Paul Farmer's flag that poverty isn't rationale enough for doing nothing for the poor and their health, a notion to which one could hardly object that also misses the whole of Farmer's oeuvre on the ways inequality and imperialism *drive* disease in the first place (see Farmer 1999, 2003). It is *not* an argument, as Richards presents it several times, for *dismissing* poverty as due cause. "Ebola is less a disease of poverty than a disease of ignorance", Richards (2016: 7) writes along the lines of the ethos of education he dismisses in its WHO practitioners. Unfortunately, the correction as enacted in the field has itself been reappropriated by the kind of Clintonite gifting that stripped post-earthquake Haiti, among other epicenters of liberal disaster capitalism, in the name of the poor, and, by some accounts, sheepdogged even Farmer into its clutches (Herz 2013; Katz 2015).

The book is sprinkled with but not spoiled by other passing fallacies of fact and argument. Richards struggles with the distinctions between pathogen spillover and propagation, and model predictions and projections. Ebola was *not* hitherto unknown in West Africa before the outbreak (Dudas and Rambaut 2014; Formenty et al. 1999; Gire et al. 2014; Schoepp et al. 2014). That the outbreak did indeed produce a media frenzy doesn't mean Ebola *wasn't* a protopandemic danger, a common category error in the biopolitics literature (Briggs and Nichter 2009; Caduff 2012; Wallace 2014).

But the biggest oversight from my vantage is that Ebola emerged in West Africa by way of the very structural causes Richards repeatedly waves aside to neoliberalism's concomitant advantage, not the first time such a convergence has been noted for such bottom-up paradigms (Bernstein 2009; Wallace forthcoming a). Disease, Ebola particularly, is explicitly presented as classless, against what is at this point nearly an epidemiological law to the contrary, specific data out of West Africa, and Richards's own observation the outbreak began among farmers (Benton 2014b; Fallah et al. 2015; Jones 2011; Kentikelenis et al. 2015; O'Hare 2015; Wilkinson and Leach 2015). The contention recalls Godelier's critique of Lévi-Strauss's inventory of the infrastructure of society. It integrates the material, ecological, and technological, terrific, but the "relations of production are conspicuous by their absence" (Godelier 2011: 22). Along the way, Richards violates the terms of the syllogism into which he aims to maneuver his readers. His

biconditional molecular Durkeimianism—repeatedly premised upon an “if and only if” design—ends up just replacing one molar explanation with another. Richards seems intent upon abstracting out contingent local conditions as irrelevant in the face of overwhelming economic geography, remote sensing, and pathogen phylogeography:

If localized variations in ecological, ethnic or political factors had driven the epidemic it seems unlikely they would have generated such a consistent wave-like pattern of early onset and early decline consistent across countries that are in many respects as different as they are similar. (Richards 2016: 43)

As if rituals are the only source of disease pattern. In fact, Ebola’s spread was much more spatially complex and socially structured at the regional level (Bausch and Schwarz 2014; Dudas et al. 2017; Olivero et al. 2017; Rulli 2017). But, relax, those results needn’t refute the benefits of a people’s science of Ebola.

What might a corrective look like? Can we find a way forward together?

My colleagues and I, taking a first stab at re-introducing a lost approach, hypothesized the Makona strain arose as oil palm, to which Ebola-bearing fruit bats are attracted, underwent a classic case of creeping consolidation, enclosure, commoditization, and proletarianization in the Guinée forestière (Wallace et al. 2014). At one and the same time, this agroforest transition—disconnecting and reconnecting the very demographic and cultural webs out of which Richards declaims Ebola emerged—curtailed artisanal production and likely expanded the human–bat interface over which the virus crosses. Almudena Marí Saéz and colleagues proposed instead that the initial spillover occurred when children outside Meliandou, including the putative index case, caught and played with bats of an insectivore species—the Angolan free-tailed bat, *Mops condylurus*—previously documented an Ebola carrier (Saéz et al. 2015).

Whatever the specific source, one of many in the region, shifts in agroeconomic context appear a primary causal factor. Previous studies show *Mops* also attracted to expanding cash crop production in West Africa, including sugar cane, cotton, and macadamia (Noer et al. 2012; Taylor et al. 2013; Stechert et al. 2014). Indeed, in contrast to bushmeat, burial practices, and

specific host reservoirs of arguably undue attention, from its initial identification in Sudan on, the Ebola genus appears repeatedly associated with shifts in land use related to nascent capitalization (Groseth et al. 2007; Jones 2011). Multiple emergent variants have been shown connected to area-specific cotton, mining, and logging (Baron et al 1983; Bertherat et al. 1999; Morvan et al. 2000; WHO/International Study Team 1978).

The expropriation and epidemiology here are entwined. Much of public health intervention, by vaccine or sanitary practices, aims at lowering an outbreak below an infection's Allee threshold, under which a population cannot reproduce enough to replace its dead (Hogerwerf et al. 2010). A pathogen, unable to find enough susceptibles to sustain itself, as our SIR model suggests, can be maneuvered into burning out on its own. But in this case commoditizing the forest may have lowered the region's ecosystemic threshold to such a point no emergency intervention—whatever biomedical or a people's science—can drive the Ebola outbreak low enough to burn out on its own. Novel spillovers suddenly express larger forces of infection. On the other end of the epicurve, a mature outbreak continues to circulate, with the potential to intermittently rebound (Barbarossa et al. 2015; Dudas et al. 2017).

In short, neoliberalism's structural shifts are no mere background on which the emergency of Ebola takes place (Wallace and Wallace 2016). The shifts are the emergency as much as the virus itself. Changes in land use brought about by policy-driven transitions in ownership and production appear fundamental contributions to explaining Ebola's area-specific emergence. Deforestation and intensive agriculture may strip out traditional agroforestry's stochastic friction, which typically keeps the virus from lining up enough transmission. The forest's complex webs of energy and information, including its mechanisms of disease control, are lost to the market sublime. We may have here, then, one explanation for West Africa's unprecedented outbreak.

Bitter ironies abound. We learn from Richards that Lord Leverhulme, whose Lever Brothers company I'll add was folded into what became transnational power Unilever, produced the first bar of soap using palm oil from West Africa. That this export crop would later serve in the emergence of a disease for which West Africans would be blamed for a failure of cleanliness

stings like soap in the eye. It's a cruel dialectic the field of One Health and its popularizers routinely enact in the course of vitalizing declensionist narratives shitting on local cultural practices and rationalizing interventions into problems, Ebola included, of their money bags' own making (Wallace 2016d; Wallace et al. 2015).

These debates—which we could organize to our parallax advantage—appear the kind of street racing reminiscent of Lenin and Chayanov's multivalent clash around the nature of the peasantry, still spinning out a hundred years later in critical agrarian studies (Wallace forthcoming a, forthcoming b). Brushing aside the sparks sprayed by our two front hubcaps—Marx and Durkheim—stuck together on the far turn, Richards's book offers a critical correction, dropping in the variables of agency and trust epidemiological modeling omits as a matter of course:

The grave cloth is muddied by the soil from the grave, and given as a keepsake to a child, who rushes in tears to the river to wash it, and the soil disappears down the stream as surely as the stream of the deceased person's consciousness had ebbed away. The cloth, cleaned and dried, lives on as bedding for the child, and a tangible last link with a departed one. (Richards 2016: 106)

There in the sleeping child's grasp, "action, materiality and signification are one", love sprouting through our fear of an orthogonal God, as much a force of nature as any mode of transmission.

## References

- Ascher M (2017) *Ethnomathematics: A Multicultural View of Mathematical Ideas*. New York: Routledge
- Atkins K, Wallace R G, Hogerwerf L, Gilbert M, Slingenbergh J, Otte J and Galvani A P (2010) "Livestock Landscapes and the Evolution of Influenza Virulence." Virulence Team Working Paper No. 1, Animal Health and Production Division, Food and Agriculture Organization of the United Nations, Rome

- Bagnato A (2017) Microscopic colonialism. *E-Flux* <http://www.e-flux.com/architecture/positions/153900/microscopic-colonialism/> (last accessed 20 January 2018)
- Barbarossa M V, Dénes A, Kiss G, Nakata Y, Röst G and Vizi Z (2015) Transmission dynamics and final epidemic size of Ebola Virus Disease outbreaks with varying interventions. *PLoS One* 10(7):e0131398
- Baron R C, McCormick J B and Zubeir O A (1983) Ebola virus disease in southern Sudan: Hospital dissemination and intrafamilial spread. *Bulletin of the World Health Organization* 61(6):997-1003
- Bausch D and Schwarz L (2014) Outbreak of Ebola virus disease in Guinea: Where ecology meets economy. *PLOS Neglected Tropical Diseases* 8(7):e3056
- Benton A (2014a) The epidemic will be militarized: Watching “Outbreak” as the West African Ebola epidemic unfolds. *Cultural Anthropology Fieldsights* 7 October <https://culanth.org/fieldsights/599-the-epidemic-will-be-militarized-watching-outbreak-as-the-west-african-ebola-epidemic-unfolds> (last accessed 20 January 2018)
- Benton A (2014b) What’s the matter boss, we sick? *The New Inquiry* 11 December <https://thenewinquiry.com/whats-the-matter-boss-we-sick/> (last accessed 20 January 2018)
- Benton A (2015) *HIV Exceptionalism: Development Through Disease in Sierra Leone*. Minneapolis: University of Minnesota Press
- Bernstein H (2009) V.I. Lenin and A.V. Chayanov: Looking back, looking forward. *Journal of Peasant Studies* 36(1):55-81
- Bertherat E, Renaut A, Nabias R, Dubreuil G and Georges-Courbot M C (1999) Leptospirosis and Ebola virus infection in five gold-panning villages in northeastern Gabon. *American Journal of Tropical Medicine and Hygiene* 60(4):610-615
- Bettez S (2013) “The Social Transformation of Health Inequities: Understanding the Discourse on Health Disparities in the United States.” Unpublished PhD thesis, University of New Mexico [http://digitalrepository.unm.edu/soc\\_etds/6](http://digitalrepository.unm.edu/soc_etds/6) (last accessed 20 January 2018)

- Briggs C L and Nichter M (2009) Biocommunicability and the biopolitics of pandemic threats. *Medical Anthropology* 28(3):189-198
- Caduff C (2012) The semiotics of security: Infectious disease research and the biopolitics of informational bodies in the United States. *Cultural Anthropology* 27(2):333-357
- Chappell M J (2018) *Beginning to End Hunger: Food and the Environment in Belo Horizonte, Brazil, and Beyond*. Berkeley: University of California Press
- Cohn S K (2008) Epidemiology of the Black Death and successive waves of plague. *Medical History* 52(S27):74-100
- Crane J T (2013) *Scrambling for Africa: AIDS, Expertise, and the Rise of American Global Health Science*. Ithaca: Cornell University Press
- Dieckmann U, Metz J A J, Sabelis M W and Sigmund K (eds) (2005) *Adaptive Dynamics of Infectious Diseases: In Pursuit of Virulence Management*. Cambridge: Cambridge University Press
- Dudas G and Rambaut A (2014) Phylogenetic analysis of Guinea 2014 EBOV Ebolavirus outbreak 2014. *PLOS Currents Outbreaks* 2 May
- Dudas G et al. (2017) Virus genomes reveal factors that spread and sustained the Ebola epidemic. *Nature* 544:309-315 <https://www.nature.com/articles/nature22040> (last accessed 20 January 2018)
- Eagleton T (1991) *The Ideology of the Aesthetic*. Oxford: Blackwell
- Eagleton T (2017) *Materialism*. New Haven: Yale University Press
- Fallah M, Skrip L A, d'Harcourt E and Galvani A P (2015) Strategies to prevent future Ebola epidemics. *The Lancet* 386(9989):131
- Farmer P (1999) *Infections and Inequalities: The Modern Plagues*. Berkeley: University of California Press
- Farmer P (2003) *Pathologies of Power: Health, Human Rights, and the New War on the Poor*. Berkeley: University of California Press

- Fearnley L A (2013) "Life at the Influenza Epicentre: Transactions of Global Health and Animal Disease in Contemporary China." Unpublished PhD thesis, University of California, Berkeley
- Formenty P, Boesch C, Wyers M, Steiner C, Donati F, Dind F, Walker F and Le Guenno B (1999) Ebola virus outbreak among wild chimpanzees living in a rain forest of Cote d'Ivoire. *Journal of Infectious Diseases* 179(S1):S120-S126
- Fortner R and Park A (2017) Bill Gates won't save you from the next Ebola. *HuffPost* 30 April [https://www.huffingtonpost.com/entry/ebola-gates-foundation-public-health\\_us\\_5900a8c5e4b0026db1dd15e6?ncid=engmodushpimg00000004](https://www.huffingtonpost.com/entry/ebola-gates-foundation-public-health_us_5900a8c5e4b0026db1dd15e6?ncid=engmodushpimg00000004) (last accessed 20 January 2018)
- Fracchia J (2017) Organisms and objectifications: A historical-materialist inquiry into the "Human and the Animal". *Monthly Review* 68(10):1-16
- Freed R S and Freed S A (1990) Ghost illness of children in north India. *Medical Anthropology* 12(4):401-417
- Garnett R G (1972) *Co-operation and the Owenite Socialist Communities in Britain, 1825-45*. Manchester: Manchester University Press
- Gire S K et al. (2014) Genomic surveillance elucidates Ebola virus origin and transmission during the 2014 outbreak. *Science* 345(6202):1369-1372 <http://science.sciencemag.org/content/345/6202/1369> (last accessed 20 January 2018)
- Godelier M (2011 [1986]) *The Mental and the Material*. New York: Verso
- Gould P (1993) *The Slow Plague: A Geography of the AIDS Pandemic*. Oxford: Blackwell
- Grmek M (1990) *History of AIDS: Emergence and Origin of a Modern Pandemic*. Princeton: Princeton University Press
- Groseth A, Feldmann H and Strong J E (2007) The ecology of Ebola virus. *Trends in Microbiology* 15(9):408-416
- Herz A (2013) The uses of Paul Farmer. *CounterPunch* 17 January <https://www.counterpunch.org/2013/01/17/the-uses-of-paul-farmer/> (last accessed 20 January 2018)

- Hewlett B S and Hewlett B L (2008) *Ebola, Culture, and Politics: The Anthropology of an Emerging Disease*. Belmont: Thomson Wadsworth
- Hogerwerf L, Houben R, Hall K, Gilbert M, Slingenbergh J and Wallace R G (2010) “Agroecological Resilience and Protopandemic Influenza.” Final Report, Animal Health and Production Division, Food and Agriculture Organization of the United Nations, Rome
- Hughes W (1951) Resistance to disease. *The British Medical Journal* 6 October
- Jones J (2011) Ebola, emerging: The limitations of culturalist discourses in epidemiology. *Journal of Global Health* 1(1):1-6
- Katz J M (2015) The Clintons’ Haiti screw-up, as told by Hillary’s emails. *Politico Magazine* 2 September <https://www.politico.com/magazine/story/2015/09/hillary-clinton-email-213110> (last accessed 20 January 2018)
- Kentikelenis A, King L, McKee M and Stuckler D (2015) The International Monetary Fund and the Ebola outbreak. *The Lancet Global Health* 3(2):e69-e70
- Kurath G and Wargo A R (2016) Evolution of viral virulence: Empirical studies. In S C Weaver, M Denison, M Roossinck and M Vignuzzi (eds) *Virus Evolution: Current Research and Future Directions* (pp155-214). Poole: Caister Academic Press
- Levins R (1998) The internal and external in explanatory theories. *Science as Culture* 7(4):557-582
- Levins R (2006) Strategies of abstraction. *Biology and Philosophy* 21:741-755
- Lipsitch M and Nowak M A (1995) The evolution of virulence in sexually transmitted HIV/AIDS. *Journal of Theoretical Biology* 174(4):427-440
- Marr J S and Calisher C H (2003) Alexander the Great and West Nile virus encephalitis. *Emerging Infectious Diseases* 9(12):1599-1603
- Mason K A (2016) Zika and the common good. *Stanford University Press blog* 9 June <http://stanfordpress.typepad.com/blog/2016/06/zika-and-the-common-good.html> (last accessed 20 January 2018)
- Mauss M (1935) Les techniques du corps. *Journal de Psychologie* 32:271-293



- Messinger S M and Ostling A (2009) The consequences of spatial structure for the evolution of pathogen transmission rate and virulence. *The American Naturalist* 174(4):441-454
- Mirowski P (2009) Postface: Defining neoliberalism. In P Mirowski and D Plehwe (eds) *The Road From Mont Pèlerin: The Making of the Neoliberal Thought Collective* (pp417-456). Cambridge: Harvard University Press
- Mirowski P (2015) *Science-Mart: Privatizing American Science*. Cambridge: Harvard University Press
- Morvan J M, Nakoun E, Deubel V and Colyn M (2000) Écosystèmes forestiers et virus Ebola. *Bulletin de la Société de Pathologie Exotique* 93(3):172-175
- Muntaner C and Wallace R G (2018) Confronting the social and environmental determinants of health. In H Waitzkin (ed) *Health Care Under the Knife: Moving Beyond Capitalism for Our Health*. New York: Monthly Review Press
- Noer C L, Dabelsteen T, Bohmann K and Monadjem A (2012) Molossid bats in an African agro-ecosystem select sugarcane fields as foraging habitat. *African Zoology* 47(1):1-11
- O'Hare B (2015) Weak health systems and Ebola. *The Lancet Global Health* 3(2):e71-e72
- Olivero J, Fa J E, Real R, Márquez A L, Farfán M A, Vargas J M, Gaveau D, Salim M A, Park D, Suter J, King S, Leendertz S A, Sheil D and Nasi R (2017) Recent loss of closed forests is associated with Ebola virus disease outbreaks. *Scientific Reports* 7  
doi:10.1038/s41598-017-14727-9
- Powell A B and Frankenstein M (1997) *Ethnomathematics: Challenging Eurocentrism in Mathematics Education*. Albany: State University of New York Press
- Richards P (2016) *Ebola: How a People's Science Helped End an Epidemic*. London: Zed Books
- Rulli M C, Santini M, David T S, Hayman D T S and D'Odorico P (2017) The nexus between forest fragmentation in Africa and Ebola virus disease outbreaks. *Scientific Reports* 7  
doi:10.1038/srep41613
- Seaver N (2015) The nice thing about context is that everyone has it. *Media, Culture, and Society* 37(7):1101-1109

- Schoepp R J, Rossi C A, Khan S H, Goba A and Fair J N (2014) Undiagnosed acute viral febrile illnesses, Sierra Leone. *Emerging Infectious Diseases* 20(7):1176-1182
- Shim E and Galvani A P (2009) Evolutionary repercussions of avian culling on host resistance and influenza virulence. *PLoS ONE* 4(5):e5503
- Spinney L (2017) Who names diseases? *Aeon* 23 May <https://aeon.co/essays/disease-naming-must-change-to-avoid-scapegoating-and-politics> (last accessed 20 January 2018)
- Stechert C, Kolb M, Bahadir M, Djossa B A and Fahr J (2014) Insecticide residues in bats along a land use-gradient dominated by cotton cultivation in northern Benin, West Africa. *Environmental Science and Pollution Research International* 21(14):8812-8821
- Strathern M (1995) The nice thing about culture is that everyone has it. In M Strathern (ed) *Shifting Contexts: Transformations in Anthropological Knowledge* (pp153-176). New York: Routledge
- Taylor P J, Monadjem A and Steyn J N (2013) Seasonal patterns of habitat use by insectivorous bats in a subtropical African agro-ecosystem dominated by macadamia orchards. *African Journal of Ecology* 51(4):552-561
- Vaughan M (1991) *Curing Their Ills: Colonial Power and African Illness*. Cambridge: Polity Press
- Waitzkin H (ed) (2018) *Health Care Under the Knife: Moving Beyond Capitalism for Our Health*. New York: Monthly Review Press
- Wallace R G (2004) Projecting the impact of HAART on the evolution of HIV's life history. *Ecological Modelling* 176(3/4):227-253
- Wallace R G (2009) Darwin's simulacrum. *Farming Pathogens* 10 August <https://farmingpathogens.wordpress.com/2009/08/10/darwins-simulacrum/> (last accessed 20 January 2018)
- Wallace R G (2012) Beware the blob. *Farming Pathogens* 30 November <https://farmingpathogens.wordpress.com/2012/11/30/beware-the-blob/> (last accessed 20 January 2018)

- Wallace RG (2013) Pscience unchained. *Farming Pathogens* 4 March  
<https://farmingpathogens.wordpress.com/2013/03/04/pscience-unchained/> (last accessed 20 January 2018)
- Wallace RG (2014) West West Africa. *Farming Pathogens* 26 August  
<https://farmingpathogens.wordpress.com/2014/08/26/west-west-africa/> (last accessed 20 January 2018)
- Wallace R G (2016a) Are our microbiomes racial? In *id. Big Farms Make Big Flu: Dispatches on Infectious Disease, Agribusiness, and the Nature of Science* (pp145-155). New York: Monthly Review Press
- Wallace R G (2016b) Two gentlemen of Verona. In *id. Big Farms Make Big Flu: Dispatches on Infectious Disease, Agribusiness, and the Nature of Science* (pp160-166). New York: Monthly Review Press
- Wallace RG (2016c) We can think ourselves into a plague. In *id. Big Farms Make Big Flu: Dispatches on Infectious Disease, Agribusiness, and the Nature of Science* (pp90-94). New York: Monthly Review Press
- Wallace RG (2016d) The virus and the virus. In *id. Big Farms Make Big Flu: Dispatches on Infectious Disease, Agribusiness, and the Nature of Science* (pp280-286). New York: Monthly Review Press
- Wallace RG (forthcoming a) Vladimir Iowa Lenin 2: On rural proletarianization and an alternate food future. *Capitalism Nature Socialism*
- Wallace RG (forthcoming b) Vladimir Iowa Lenin 1: A Bolshevnik's study of American agriculture. *Capitalism Nature Socialism*
- Wallace R G, Bergmann L R, Kock R, Gilbert M, Hogerwerf L, Wallace R and Holmberg M (2015) The dawn of Structural One Health: A new science tracking disease emergence along circuits of capital. *Social Science and Medicine* 129:68-77
- Wallace R G, Gilbert M, Wallace R, Pittiglio C, Mattioli R and Kock R (2014) Did Ebola emerge in West Africa by a policy-driven phase change in agroecology? *Environment and Planning A* 46(11):2533-2542

- Wallace R G and Wallace R (eds) (2016) *Neoliberal Ebola: Modeling Disease Emergence from Finance to Forest and Farm*. Cham: Springer
- Wallace R, Chaves L F, Bergmann L R, Ayres C, Hogerwerf L, Kock R and Wallace R G (2018) *Clear-Cutting Disease Control: Capital-Led Deforestation, Public Health Austerity, and Vector-Borne Infection*. Cham: Springer
- Wark M (2015) *Molecular Red: Theory for the Anthropocene*. New York: Verso
- Watts S (1997) *Epidemics and History: Disease, Power, and Imperialism*. New Haven: Yale University Press
- WHO Ebola Response Team (2014) Ebola virus disease in West Africa—the first nine months of the epidemic and forward projections. *The New England Journal of Medicine* 371:1481-1495
- WHO/International Study Team (1978) Ebola haemorrhagic fever in Sudan, 1976. *Bulletin of the World Health Organization* 56(2):247-270
- Wilkinson A and Leach M (2015) Ebola—myths, realities, and structural violence. *African Affairs* 114(454):136-148
- Wittgenstein L (2014 [1956]) *Remarks on the Foundations of Mathematics*. Eastford: Martino Fine Books
- Wolfe N D, Dunavan C P and Diamond J (2007) Origins of major human infectious diseases. *Nature* 447:279-283
- Žižek S (2012) *Less Than Nothing: Hegel and the Shadow of Dialectical Materialism*. New York: Verso
- Žižek S (2017) *Lenin 2017*. New York: Verso

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