— URBAN WORLDS

— COMPOSING URBAN ORDERS FROM RUBBISH ELECTRONICS: Cityness and the Site Multiple

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Abstract

What do cities look like when rubbish electronics are the vehicle with which they are explored? This article is an experiment designed to offer a response to that question, and in doing so to productively intervene in the conversation about 'cityness', 'metrocentricity' and 'subaltern urbanism'. We intervene by following flows of rubbish electronics and the action that enacts them as waste and value, drawing on fieldwork in Dhaka, Singapore, Accra and Canada's Greater Golden Horseshoe. Our intervention is an experiment in writing an urban geography of rubbish electronics as a site multiple. We show how following the circulation of rubbish electronics offers a manyfolded synopsis of cities: urban enclaves of high finance and the information economy are also industrial waste producers. Peri-urban industrial zones are also managers of brands, legal liability and corporate public relations. Cities off the map are also urban innovation systems, while waste is rekindled as value and accumulated as poison. Thereby we suggest how a sensitivity to the site multiple may be a helpful way of grappling with shifting ontology and the performativity of our research practices in urban studies.

> 'to live in one city today means living in many, as any individual city folds in and stretches itself across urban experiences, information, and economies throughout the world.'
> AbdouMaliq Simone (2010: xiii)

Introduction

This article is about 'cityness' (Simone, 2010). Specifically, we situate our work on rubbish electronics as an intervention in a conversation in which 'cityness', 'metrocentricity' and 'subaltern urbanism' meet. Cityness is Simone's (2010: 3) term to describe the state or condition of cities as things 'in the making', rather than things that are determinate, bounded and ready-made for analysis. Metrocentricity is Bunnell and Maringanti's (2010) term to describe a variety of tendencies in Anglophone urban

studies, such as an emphasis on prominent financial centres, particularly in English-speaking countries, and the examination of linkages between these centres and other cities only to the extent that the latter refer back to the former. As Bunnell and Maringanti (2010) point out, these biases have been highlighted by others (for example, Robinson, 2002; Robinson, 2011) and indeed acknowledged, at least partially, by those at whom such criticism has been directed (for example, Smith, 2003). But Bunnell and Maringanti (2010) push the debate further by making a convincing argument about the performativity of urban studies, perhaps particularly, but not exclusively in its Anglophone variety. That is, they draw attention to some of the ways in which the actual practices of urban studies, its pedagogy and methodology, play an important role in partially generating the very phenomenon it purports to be merely studying. Ananya Roy takes some of the insights of metrocentricity to also speak to certain limits she sees in subaltern urbanism as an intervention into the metrocentricity of urban studies. For Roy, subaltern urbanism is an urban studies which writes 'against apocalyptic and dystopian narratives of the megacity' (Roy, 2011b: 226). It is thus an important intervention because 'it seeks to confer recognition on the spaces of poverty and forms of popular agency that often remain invisible and neglected in the archives and annals of urban theory' (*ibid.*: 224). But she also warns us to question the limits of subaltern urbanism. She notes that among other things, it may slip too easily into a celebration of subalternity as a redemptive Other to another problematic figuration, that of the dystopic 'megacity' as metonym for the global South. Given these limits to subaltern urbanism, Roy (*ibid.*) offers an alternative schema comprised of four possible breaks from them: peripheries, urban informality, zones of exception and grey spaces. For Roy these concepts are 'useful heuristic devices that we can use to reassemble the normalized category of the urban' (Roy, 2011a: 2).

Our point in this article is not to critique metrocentricity, subaltern urbanism or Roy's alternatives as approaches to cityness, if by critique is meant a practice of debunking one set of concepts in favour of other supposedly 'better' or more 'realistic' ones. Instead, our point is to offer up a methodological sensibility, which we call the site multiple, to add to these productive interpretive tools available for investigating cityness. Cityness has its more-than-urban geographies (Simone, 2010). Getting at cityness, then, requires analytical tools that might enable analysts to follow action that not only partly generates cityness, but which, when followed, may also exceed it. Rather than a theory of 'the urban', the site multiple can be construed as a helpful 'thinking technology' (Haraway, 2004: 336) that can be put to work with, rather than against, the interventions of metrocentricity, subaltern urbanism and Roy's alternatives. To this end, and inspired by the work of Bruno Latour and Annemarie Mol, we wish to compose a case for what we call the site multiple as a way to follow practices that generate cityness and its more-than-urban geographies (see also McFarlane, 2011; Dovey, 2012; Farías and Bender, 2012).

Here is what to expect: our article asks our readers to engage in a twofold experiment. First, we mobilize Latour's notion of composition *in lieu* of critique (Latour, 2010). Certain modes of critique have, Latour argues, 'run out of steam' (2004: 225) as modes of analysis in the social sciences. This is because critique often forgets its own key lesson: all knowledge is constructed. The problem, Latour (*ibid.*) shows, is that critique typically deploys a constructivist metaphysics about that of which it is critical (for example, capital, power) and a realist metaphysics about that with which the hammer of critique is wielded (i.e. the social, as in capital or power are 'socially constructed'). Yet, if the central (and correct) lesson of critique is that *all* knowledge is constructed, then there is no room for such duplicitous metaphysics: if all knowledge is constructed, then social *constructedness* cannot be a basis of difference between X and the critique of X. Instead of this kind of critique, Latour proposes the notion of composition. A compositional approach means critique is staged differently. Instead

of debunking matters of fact (which, since all knowledge is constructed, cannot be adjudicated as not constructed, therefore true versus constructed, therefore false), it examines matters of concern. Matters of concern acknowledge that since everything is constructed, a different question needs to be posed: how well or badly constructed is that which concerns us? 'It is time to compose', Latour claims, 'in all the meanings of the word, including to compose with, that is to compromise, to care, to move slowly, with caution and precaution' (Latour, 2010: 487). One might be tempted to ask for a list of criteria that could adjudicate between what is well and badly composed. To give in to that temptation, however, would imply a set of criteria imposed from outside and in advance of actually doing a composition. Yet, in a compositional mode there is no recourse to an outside, no neutral register or list of criteria (i.e. real and true facts or reality that are unconstructed) by which one might universally be able to judge how good or bad an account is. The puzzle of whether an issue is well or badly composed must be solved locally and practically (see Latour, 2010: 473–74, and endnote 7). What we can say is that rather than subtract from reality (for example, claim the city is really merely a social construct), well-composed matters of concern are those that add to reality (for example, by leaving open the possibility that the issue of cityness may be made up of more than or something other than the urban); well-composed matters of concern open up an issue rather than close it; they stage a gathering that those who are interested can assemble to carefully dispute, debate, deal with and stitch together new ways of going on together.

In what follows we compose some emblematic urban locales differently in terms of another way of doing and knowing cityness. We use rubbish electronics as a vehicle with which to explore them, citing a variety of examples from our research. The compositions we do offer are one possibility among a multiple. They are neither dualistic nor exhaustive. We will suggest how urban enclaves of finance, insurance and real estate (what is known as the FIRE economy), which in some strands of urban studies stand in for the rise of a new type of city (i.e. world or global cities) and its attendant economy, are also industrial waste producers and thus belie their common representation as flagships of a dematerialized or virtual information or knowledge economy. Subsequently, peri-urban industrial zones—which if they appear at all in the literature on global cities and information economies—will be shown to perform some of the same roles typically assumed to be the purview of those urban enclaves associated with the FIRE economy, such as brand management, legal liability protection and corporate public relations. Thirdly, cities that are 'off the map' (Robinson, 2002) will be shown to exhibit characteristics of urban innovation systems often associated with those 'global' cities that compose the map of metrocentricity that Bunnell and Maringanti (2010) show to be so problematic.

To do all this, we need to risk starting somewhere other than the place of critique. Somewhere more indeterminate. Doing so forms the second part of our experiment. We use a particular—some might say peculiar—mode of writing that deliberately throws our readers into the middle of things, *in medias res* (Latour, 2005). The phrase *in medias res* denotes a mode of storytelling that deliberately relies on nonlinearity and surprise to shape its narrative and elicit insight about that which it narrates. As Latour (*ibid*.) shows, our analyses are unavoidably *in medias res*. Through the narrative technique of writing *in medias res* our article asks readers to engage with disconcerting moments—moments of surprise—that occurred during our ethnographic fieldwork. Such moments are, as Winthereik and Verran (2012: 39) suggest, useful as a 'loosening agent' that might work against the over-hasty hardening of analytical presuppositions and categories. A conversation in which cityness, metrocentricity and subaltern urbanism meet may risk such closure of their objects of inquiry as urban. As an analytical device, the site multiple may offer a loosening agent to keep open the very question of what composes citynesss.

By way of introducing the site multiple we turn to an ethnographic surprise to illustrate two key insights from studies that follow the practices of wasting and valuing (for example, Hawkins and Muecke, 2003; Gregson and Crang, 2010; Gregson *et al.*, 2010): first, that a site construed as necessarily about one thing (for example, the final disposal of used commodities) can defy such presuppositions and be something else too. It can, in other words, be a multiple; and secondly, that we must develop a sensitivity to the performativity of our own research practices, because they partially format the ontology of that which we claim to only study.

Cityness *in medias res*

The building in Dhaka into which we step is unfinished. From the second floor up, concrete and brick steadily give way to rebar and bamboo. The only light is the sun angling through windows-to-be and a bare bulb in a back-room storage area. All around us are bales of circuit boards, dusty, chipped and tied with twine—stack upon stack. We are served tea and sweets while we talk with Mr Shazil.[1] Mr Shazil is an importer/exporter of rubbish electronics, a specialist focused on motherboards and chipsets. When he sources domestically, he uses a coterie of boys, 15 or 20, who scour the city for their chance, earning a flat rate of BDT120 (about US $1.85) per kilogram. He'll bulk up his stock for 6 or 7 months and then ship a container, 8 or 9 metric tonnes worth of these rubbish electronics, to a Singaporean-based smelter. Mr Shazil buys at US $1.85 per kilo; he sells at US $6. The Singaporean company smelts the boards for precious metals, especially gold. Here was a poor country exporting e-waste for processing to a rich country. Not something we expected.

We had flown to Dhaka to track what we thought was e-waste (Lepawsky and Billah, 2011; Lepawsky and Mather, 2011). Yet rarely did we find anything like it. Instead we witnessed the practical assembling of people, places and things into value. Objects, materials and money changed hands. Work was done: disassembling, reassembling, smashing, washing, repairing, rebuilding, refurbishing. For example, in one small room, a hot plastic press run by a single person received plastic pellets from a separate one-room business next door that in turn had received baled plastic from dismantled computer printers just up the street. That worker running the hot plastic press was churning out dozens of CD and DVD cases, some of which were sold domestically, while the rest were exported to other countries in the region, including China and India. In contrast to what we had expected in following the things and actions of rubbish electronics, we had not (and did not) wind up in dumpsites. We wound up in production sites. This surprise was disconcerting. It made us question our ontological assumptions about rubbish electronics as a phenomenon—and the vast bulk of the literature we had familiarized ourselves with in order to do our research. It made us think about common analytical devices in that literature (such as 'final consumption', such as 'disposal', such as 'end-of-life electronics') quite differently. Indeed, we began to question the very notion that e-waste is emblematic of a global economy with inherent beginnings and endings (Lepawsky and Mather, 2011). What the ecology of rubbish electronics practices we witnessed in Dhaka suggested to us was that instead of following actions and things to the end of the global economy where they are ejected as waste, we were right in the middle of practices of economization (Callon and Muniesa, 2005; Çalışkan and Callon, 2009; 2010).

This ethnographic surprise forced us to think more carefully about the per-formativity of our own research practices. For example, the research questions we formulated (i.e. about e-waste qua waste) had played a partial role in formatting the ontology of the phenomenon we claimed to only study. In other words, we partially generated the very thing we wanted to research. As others have shown, such partial

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1   All names are pseudonyms.

formatting is inevitable (see, for example, Haraway, 1991). We have to understand that our theories, our questions and methods are worldings (Spivak, 1985; Law, 2004a; Tsing, 2005; Haraway, 2008; see also Roy, 2011a; 2011b). If the work on the performativity of research is correct, then the 'trap' of performativity cannot be escaped in favour of theories, questions and methods that claim to be separate and outside the worlds we research. If, as particular streams of the performativity literature suggest (for example, Callon, 2007), our research always partially generates that which we claim to study, then it will also always generate surprises we cannot anticipate until we are in the midst of things. If such surprise is in a sense inevitable, then escape from it—even if it were possible—may be a misplaced desideratum. Instead, we may need to find ways to use surprises to muddle on in the mess of research praxis (Barad, 2003; 2007; Law, 2004a). If our research is performative and the ontology of that which we study multiple, what might we do to leave the possibilities open to inevitable—but productive—surprise and disconcertion? How might we enable research on cities not as *a priori*, but as 'spaces that are continually created through our own practices of connecting, travelling and representing' (Bunnell and Maringanti, 2010: 419)? Through our work on rubbish electronics we explore the site multiple as a possible answer to these questions.

The site multiple is inspired by the work of Annemarie Mol (2002) on the body, or in her terms, the body multiple. In her work, the body is a site enacted through practices. As Mol shows, the same object/body that one might take for granted as a single thing, is, when one follows the practices that enact it, actualized through many different actions that are distributed, patchy, not necessarily coherent, and which may clash with one another: the body-with-atherosclerosis-in-a-Dutch-hospital is enacted differently in the clinic, in the surgery and in the pathology lab. In the clinic, that body is a person with whom a physician may devise an exercise routine focused on walking or someone who may, instead, opt for surgery. In the surgery that body is a suite of arteries with varying degrees of plaque to be removed, not a body that may walk away its disease. In the pathology lab that body is a series of blood pressure measurements, which might indicate severity of disease or, if the resulting numbers do not correspond well with the person's descriptions of pain or inability to walk a certain distance, might not. Thus, the singular object/body is more than one, it is multiple. As such a site, Mol suggests, the body multiple is 'more than one, but less than many', yet not fragmented (Mol, 2002: 55, 84). It is distributed, patchily, in various parts of the hospital; it simultaneously 'hangs together', yet may also be 'clashy' (for example, surgery and walking therapy are mutually exclusive practices of care) (*ibid*.). What Mol is claiming about a body-with-atherosclerosis-in-a-Dutch-hospital is, she is also claiming, possibly true for other objects or phenomena too (for another elaboration of these claims, see Mol, 2013). It is this possibility from which we propose the site multiple as a potentially useful analytical device or sensibility for urban studies.

One reason to think with the site multiple is that it is an indexical possibility. By 'indexical possibility' we mean this: the English word 'site' connotes specificity, but denotes no inherent specificity. Indexicality is a technical term with linguistic and philosophical meaning to describe a class of things (for example, words such as 'here', 'there', 'near', 'far', or gestures such as a pointing finger) that point to something specific, but whose specificity derives from the situation of which the word or gesture is partly generative (along with a myriad other things). If one of us were to hold up a finger (hence *index* finger) and exclaim: 'Look at that!', neither the gesture nor the word 'that' on its own would inherently designate anything in particular. But if one of us were to do so while pointing to, say, a particular image on a screen in a lecture hall, the gesture and the word would take on specific meaning within the situation of which they are partially generative. Like other indexical possibilities, 'site' takes on particularity and specificity only in the situation in which it is enacted. If site is an indexical possibility, then its being (ontology) and knowing its being (epistemology), or what Barad (2003)

calls onto-epistem-ology in order to signal their inseparability, are premised on the worldly, situated actions that enact a site into being. These actions include those of the researcher(s) whose questions, theories, methods, tools and other equipment are partially generative of the world being studied. Indexicality is neither the claim that language on its own produces the world, nor the idealist notion that the analyst brings the world into being by ideas on their own. Instead, indexicality signals that practices are ontologically generative; they enact things such as a body or a site.

For Mol, the body multiple indicates not plurality, but manyfoldedness. Likewise, the site multiple is not the same thing as multi-sited. The distinction is important even if it may at first seem trivial. Multi-sited implies many individual sites that are perhaps connected to one another through some common thread. The site multiple is different. This difference entails that as a phenomenon it is distributed in its enactment through practices and affordances of materials patchily, unevenly and not necessarily coherently (on a key distinction between incoherence and non-coherence, see Law, 2004a; 2004b).

Mol's manyfolded body multiple is a topological and praxiographic notion (Mather, 2014). Let us look into the former first. Topological sensibilities inform a range of work in geography and are certainly not new (Paasi, 2011). But as Allen (2011) argues, contemporary topological concepts and their use of perhaps banal terms such as folding can, nevertheless, jolt us into new understandings of contemporary social life. In Mol's work (for example, Mol and Law, 1994; Law and Mol, 2001) topological thinking has been important for coming to grips with arrangements of people, places and things that hang together even as they do so in patchy, distributed and non-coherent ways (see also Law, 2004b; Marres, 2012). Mol's notion of manyfoldedness implies that it is important to consider where folding touches, separates or otherwise intra-acts (Barad, 2003; Barad, 2007). It is here that we bring in our notion of boundaries and edges to help us further elaborate the site multiple. We introduced these analytical devices elsewhere as useful for dealing with the problems of linearity and ontological multiplicity in analyses of global production networks (GPN) and global commodity/value chains (GCC/GVC) (Lepawsky and Mather, 2011). However, in that earlier work we speculated that as analytical devices boundaries and edges might have purchase beyond the specifics of GPN and GVC/GCC studies. In developing this possibility here, we suggest that the site multiple, like boundaries and edges, is an effect of ordering relations. Boundaries connote relations or associations of separation, but also of crossing and changing, of trans-formation; edges those of difference but also of contact, of adjacency, of possibilities of transformation or laminarity or friction (see Tsing, 2005; *cf*. Rabeharisoa, 2004). Boundaries and edges are results of the site multiple's manyfoldings. Collectively, they are adpositional; they are indexical possibilities of enactment made manifest where practices and the affordances of objects and materials mingle (*cf*. Schatzki, 2002). If enactment ceases or changes, so does the indexicality that enables their collective possibilities. In order to ground our claims about the site multiple, the rest of the article details some surprises derived from ethnographic fieldwork that follows the travels of e-waste in distant, but manyfolded, cities.

Urban enclaves of FIRE are also industrial waste producers

Urban enclaves of finance, insurance and real estate (the FIRE economy) are typically the qualifiers of global cities in the information age. Nodes in networks. The world in the wires (Kitchin, 1998), burning bright FIREs. Gregson and Crang (2010: 1031) tell us 'not just that materiality matters to the development of waste scholarship but that a focus on industrial waste matters to the development of work on materiality'. So why would we look here, in the FIRE? The underwriting of the knowledge economy of the urban enclaves of high finance is stubbornly material stuff: monitors, cellphones, hard drives, servers, keyboards. No one really knows how much is out there. One guess

puts the combined disposal of 'end-of-life electronics' from the industrial, commercial and institutional (IC&I) sector in Canada and the US, for example, at more than 1 million tonnes annually (PHA Consulting Associates, 2006: 2–7). Much is made of the contribution of FIRE enclaves to global economic networks, but what of their rubbished electronics? Where does all that stuff, the ever-increasing detritus of the 'information economy', go? These materials do not disappear. What do cities come to look like when we follow them?

In Singapore one electronics processor told us that data held on end-of-life FIRE electronics are so sensitive that firms would rather be 100% safe with their disposal than leave any chance of sensitive information leaking out. As a result, even though there are many ways of safely sanitizing IT assets, significant numbers (he wouldn't tell us how many) of hard disks and servers end up being incinerated. The digital economy is not frictionless at all; it has a carbon footprint, a global-warming potential (Teehan and Kandlikar, 2012), stubborn materiality. There is lots of friction (Tsing, 2005) in FIRE. This is why it is important to unbracket the practices. Don't simply follow things: follow the action. To think 'industrial waste' is to invoke chemical spills, mine tailings, metallic manufacturing remainders from stampings and castings. Hazards. But what of the toxic substances of computers (see, for example, Bi *et al.*, 2007; Chan, 2008; Leung *et al.*, 2010; Liulin *et al.*, 2011)? And of cellphones (see, for example, Nnorom and Osibanjo, 2009a; 2009b)? Of these tokens of the urban enclaves of high finance?

Electronics. Rubbished. For Thompson (1979), rubbish is not synonymous with waste or garbage, but is instead a material-semiotic holding category that objects may be moved into and out of (see also Appadurai, 1986; Kopytoff, 1986), a grey zone (see Roy, 2011b). Districts of corporate and financial headquarters are also the realm of industrial waste production via their turnover of electronic equipment. High-finance, insurance and real estate firms also generate huge amounts of information and provide services for millions of people. As a consequence, there are terabytes of information stored on computer systems that are often scheduled for replacement every few years. Informed materials. For Bensaude-Vincent and Stengers (1996: 206), 'one develops an "informed material" in the sense that the material structure becomes richer and richer in information'. They are another waste-management problem, these informed materials—one overlooked with too strict a focus on materiality. Materiality and information mingling. This is another reason why we must follow the action, not only things coming apart.

Peri-urban industrial zones are also managers of brands, legal liability and corporate public relations

We are driving the long ribbons of highway that thread the Greater Golden Horseshoe, an urban agglomeration of over 8 million people, home to nearly a quarter of Canada's entire population. We have just left an industrial-scale recycling facility on the outer edges of Toronto and are en route to an interview at another. As we drive we are reconstructing the interview and tour we had of the facility with our audio-recorder running. Always record. In the midst, we realize something: despite what we just saw, all the heavy machinery at the previous facility, despite all the noise, despite the safety gear, the helmets, the goggles, the gloves, and despite the hundreds of tonnes of metals, plastics and glass that flow in and out of that facility daily, what we heard is that the company derives its profit from the information economy, not the industrial economy. Let us explain.

The firm—let us call it X—processes hundreds of tonnes of rubbish electronics per day. They run three shifts, 24 hours a day, 5 days a week. Sorting, primary shredding, secondary shredding, automatic sorting, screening, sifting, eddy current and magnetic separation. Multi-step refinement. Primary shredding: destruction of the new (retail

overstock and returns) and the old (working but not wanted, not working and not wanted). Whole photocopiers dropped into steel teeth. The sound is fantastic. Out come chunks of former information economy. Now moving along a conveyor belt, feeding into secondary shredding. Secondary chops it all up. Soccer-ball sized. All those former electronics drop into the super granulator. Granulate, separate, divide and multiply: (desktops + laptops + cellphones + monitor cases + photocopiers + faxes) / (sorting + shredding + screening + separating + sifting) = plastics, aluminium, steel, copper, dust. Screened, sifted and separated—wholes fragmenting to be re-grouped, again and again.

Multiplicity proliferates just as all this 'stuff' reaches what Sam, the manager we were interviewing, calls its 'final resting place'. When we ask what he means by that, Sam explains, 'to us [company X], "final resting place" means the material [formerly e-waste] has reached commodity-grade status, which means it can be sold on the open market'. Now, note this paradox. What Sam describes as final is, simultaneously, a dissolution of certainty about end points and a profusion of potentiality, of ongoingness (see Lepawsky and Mather, 2011). Plastics, aluminium, steel, copper and, yes, even dust (a source of metals such as lead, gold, silver and platinum) are ready to be sold on to the planet's manufacturing industries that use them to produce things. And yet, despite processing hundreds of tonnes of rubbish electronics a day into commodity-grade material, it is not this heavy industrial work from which company X earns its profits.

Here's Sam again: 'The commodities market is a fool's game'. Too volatile. Too uncertain. That's how he describes it. It's not where sustainable profit comes from. Indeed, at the time of the interview, scrap-material prices were plummeting (Richtel and Galbraith, 2008; Levin, 2009) and the Great Recession had only just been named. But X and—as we would learn later—the next firm we were en route to weren't worried. They'd made their profit before a single ounce of processed e-waste had left their facilities. Sam tells us it works like this: you, a sales rep from X, call up banks, retailers, law firms, hospitals—anyone with lots of IT equipment with lots of data on it. And then the sales rep asks: who in your organization goes down if one of your hard drives ends up in an exposé about companies dumping waste in developing countries (see, for example, CBS, 2009; Klein, 2009; Höges, 2009) or in a news story about losing customers' credit card numbers, their social insurance numbers, patients' health histories, or clients' legal records (see, for example, CBC News, 2009)? It's a brisk business for X's sales department. But what it means is this: these electronics recycling firms, these huge industrial-scale operations processing hundreds of tonnes of rubbish electronics each day, actually make their money by producing pieces of paper: certificates of secure data destruction. For a little more money, they'll also produce a video for you showing your specific machines falling into the shredders and coming out as bits and pieces too small to be read by even the best data pirates. These huge industrial-scale recycling operations make their profit from producing information about the destruction of information. They are their customers' other brand managers, litigation mitigators and public-relations consultants, here in the peri-urban industrial zones on the edges of the FIRE.

This relationship then materializes corporate identities, as firms in the urban core have an interest in being seen as good corporate citizens who do not pollute but manage their waste in appropriate ways. In contrast, e-waste processors market themselves as offering what Sam called 'an insurance policy'. They are brand protectors who offer firms in the urban core a type of insurance against negative publicity related to wasting practices deemed inappropriate.

Cities off the map are also urban innovation systems

In the streets of Dhaka we kept following the things we could recognize as used and discarded electronics. We cross the Buriganga River and find metal from circuit boards being transformed into gold and silver bars, into household hardware. In a

tiny shack two women squat on a dirt floor and, using tongs, heat circuit boards over propane-fuelled flames. We can smell the monomers, see the cloudy discharge from rain-soaked sacks of electronic detritus snaking into a nearby stream, hear the tap-tap-tapping of the circuit boards against wok-like pans as the women work the metals loose. Adjacent to this shack is a separate business. All men. They work a lathe, a small in-ground furnace and hand-crafted moulds. As we stand there, one of the men is selecting parts from their stock of metal scraps, sourced in part from the women in the shack next door. This time he happens to select parts of an aluminum frame from a desktop computer tower and a belt buckle that is clearly branded 'Tommy Hilfiger'. In the heat of the furnace, two 'global' industries, garments and electronics, melt into each other, fold together. Then they are cast into an altogether different sector: not electronics, not garments, but decorative home hardware. The ornate gate lock that emerges from the furnace is one of four styles, including one the workers here call 'antique', developed by them in this tiny shack, that is, in this production facility. The hardware will be sold in Dhaka and Japan. The precious-metal bars are brought back over the river. They get sold to wholesalers, to jewellery makers. From there the jewellery makers in Old Dhaka create ornate gold and silver jewellery that is sold domestically, but also exported to Singapore and India (see Lepawsky and Mather, 2011). Economization *in media res*, a site multiple with many folds—profit, status, love, ritual, aesthetics, identity, difference—boundaries and edges of the site multiple proliferating where the folds touch, conjoin, transform, separate and otherwise intra-act.

Elsewhere in the city on a different day we spend several hours with Mr Sajib. He and his four employees (two male technicians, a woman and young boy) repair, refurbish and dismantle rubbish electronics. When we ask how well his business is doing, he shows us the daily norm of extracting a 230% profit margin from a rubbished cathode ray tube (CRT) monitor (for details, see Lepawsky and Billah, 2011).

The women in the shack, the men making hardware next door and Mr Sajib's business are among the myriad small firms comprising a cluster, a learning and innovation system, of rubbish electronics resellers, refurbishers, repairers and dismantlers in Dhaka, this city off the map (Robinson, 2002). Importers bring rubbish electronics to Dhaka from more than a dozen countries, mostly from Asia, but North America and Europe are sources too (Lepawsky and McNabb, 2010; Lepawsky and Billah, 2011). There are five or six large importers of rubbish electronics on Elephant Road. Approximately 1,500 smaller related enterprises congregate around them: double the number we found the year before. Elephant Road and Gulisthan are where you go if you're looking for an affordable Windows PC. Motijheel is for Apple.

The sector is intensely specialized: firms and myriad linkages to other sectors, providing labour, providing material inputs into other production industries. Plastics, metals and glass. From rubbish electronics and other tailings of the urban mine (Jung, 2009; Yamasue *et al.*, 2009; Peters, 2011). Moved to Lalbagh and Kotwali. In Lalbagh these materials mix into the material streams of other scrap sectors and are returned for the production of household goods and sundries (for example, plastic containers, cutlery and cooking implements). The plastics manufacturers of Lalbagh, some licensed and formal, some neither, draw their material inputs from the city's rubbish. They have their own copyright- and intellectual-property-protection system, enforced through their trade association (Kulke and Staffeld, 2009). Dealers of rubbish supplying the cluster advance loans to the *ferrywallas* and *tokais* that pick through the city's cast-offs, tying them to a dealer's shop. Debt serfdom. Poverty capital (Roy, 2011b). Mining the city and the 'fortune at the bottom of the pyramid' (Roy, 2011b: 229, citing Prahalad). Materials circulate, but so do people, so does knowledge. The rubbish electronics cluster as learning and innovation system. Refurbishers, remanufacturers and repair operations rely on skilled labour to return rubbish electronics to working order or transform them into different products. Though the technicians working here are

highly skilled, our interviews indicate that few (less than 5%) have any formal training or qualifications (see Lepawsky and Billah, 2011). Often they began working as young boys, for refurbisher and repair operations, as 'shop boys', to help manage routine office functions such as customer calls and orders or to do tasks such as serving tea. Over several years, these shop boys learned their skills through apprentice-like arrangements from more experienced technicians in the shop. In many cases, the proprietor of the operation himself began as a shop boy and became a technician, later launching his own business.

Dhaka—this globally ordinary city off the map (Robinson, 2002)—buzzes clustering, learning and innovation. In this action we find many of the characteristics deemed important in terms of the Globalization and World Cities (GaWC) programme: upgrading, skill and knowledge transfer, innovation and creativity, even patenting and intellectual-property protection (see Kulke and Staffeld, 2009). In this sense, our work on rubbish electronics in Dhaka echoes the cautionary refrain in the literature to beware of mistaking urban theories derived from studying the specificities of the global cities of the North/West as theories of The City per se (see, for example, Robinson, 2002; Bunnell and Maringanti, 2010; Roy, 2011b).

Rekindling value and accumulating poison

Accra, Ghana: a city approaching four million people (Ghana Statistical Service, 2012). Destination for northern migrants: pushed by inter-tribal conflict in the north, or declining access to and productivity of farmland; pulled by the lure of opportunities for waged labour in the city (Oberhauser and Yeboah, 2011). We're standing in an ash-blackened field. Agbogbloshie. Young men and boys are torching piles of wire using foam insulation as fuel. They want the copper from the wires, but not the plastic sheathing that encases them. The flames are low. It's hard to keep the wires burning because their plastic coatings are doped with brominated flame retardants, or BFRs. The expected chemical smell is less than we imagined. The BFRs have names such as polybrominated diphenyl ethers (PBDE) and hexabromo cyclododecanes (HBCDD). The field is saturated with heavy metals too (Caravanos *et al.*, 2011). Lead. Mercury. Cadmium. Today, the winds trend south-southwest, carrying the smoke from the wire fires over nearby vegetable gardens. Those rows of green and brown furrows at the edge of the field? They'll feed the poor(er). The cows and goats corralled and grazing here in Agbogbloshie? They'll feed the rich(er). Electronics, chemicals and food folded together. Realities of class enacted collaterally (Law, 2009). A site multiple.

Copper and other metals—such as aluminium, steel and iron—that are recovered here will be moved along to the domestic industry, such as the foundries and factories in Tema, Accra's planned industrial-twin-cum-Greater Accra Metropolitan Area, GAMA. We visited a steel foundry there. It uses an induction furnace to melt scrap metal sourced from Agbogbloshie and other places in GAMA that gather the city's riddings.

Induction—that means electricity. That means Akosombo Dam on the Volta River. Finished in 1965, the dam created the world's largest anthropogenic body of water, Lake Volta, over an area of 8,503 km^2. Did you know that this is more than eight times bigger than the lake behind the Three Gorges Dam on the Yangtze River in China? During the construction of the Akosombo Dam, 80,000 people were forced to relocate. Disease vectors multiplied. And 3% of Ghana was submerged. Water transportation options increased. So did some forms of fishing (Gyau-Boakye, 2001). Manyfoldedness proliferated. The site multiple hangs together, is patchy and clashy.

Back into steel foundries the metals go, for manufacturing rebar for the domestic construction industry. Building GAMA from scrap (*cf.* Gregson, 2011). Circuit boards and other precious-metal-bearing rubbish electronics come to Tema too. They go to the free zone. Once there, Indian-based firms will shred them and export them to India for processing, for extracting the gold, the silver. This is 'south-south trade':

West Africa to South Asia. One so-called 'developing' country exporting to another, richer, so-called 'developing' country. This is not the usual ENGO e-waste storyline.

Back at Agbogbloshie, near the burn site, you will also find the dismantlers hammering apart all kinds of metal-bearing things: auto parts, mining equipment, washing machines. And along with the dismantlers there are the tinkerers, the repairmen, the assemblers and builders, the women hawking food and water. Similar, but not identical, to Dhaka. Right in the middle of Agbogbloshie you can order a custom-configured PC, built from rubbish electronic parts sourced from the digitizing city. Do you, the reader, know how to build your own computer from scrap parts? These 'primitive recyclers'—as they are often referred to in the dominant e-waste storyline—do (see, for example, Basel Action Network, 2002; Greenpeace International, 2008). Further along the nearby road you can pick up grills, shelving, furniture, washbasins and bins built by the micro-manufacturers at Agbogbloshie from former cars, trucks, backhoes, what have you. Disassembling and reassembling. Material affordances and the creative capacities to re-imagine and re-work them. Risky conditions. Access to livelihoods. Exploitative labour practices. Access to technology. Toxic body loadings. Upgrading of technical skill and know-how. Heavy metals leaching into soil and water. The extension of the useful life of electronics. Airborne fallout of carcinogens. Material reuse. Transformation. Object fluidity (Mol and Law, 1994; De Laet and Mol, 2000). Dangerous possibility (Beisel and Schneider, 2012). A site multiple, material and manyfolded.

You can't escape materiality. Remember the Greater Golden Horseshoe? Digitizing cities lead elsewhere when e-waste is the vehicle of exploration. Such as to Belledune, New Brunswick (population: 1,711). Such as to Horne, Quebec (population: 39,324). Such as to Trail, British Columbia (BC) (population: 7,237). To three of Canada's major smelters that process rubbish electronics as part of their feedstock. To the primary sector. Digital economy meets industrial economy. Metropolis meets resource town. And what results from that intercourse? At Belledune one of the results is 'dispersion of smelter effluents and atmospheric emissions' of arsenic, cadmium, copper, mercury, lead and zinc into Chaleur Bay (Parsons and Cranston, 2006: 259). At Horne one of the results is aeolian deposition of metal-bearing dust from smelter emissions (Zdanowicz *et al*., 2006). That means cadmium, copper, lead and zinc, among other metals, becoming humus, becoming soil. In 2001 the Horne smelter emitted 65 tonnes of lead (down from 1,700 tonnes in 1974) and 2.5 tonnes of cadmium (down from 110 tonnes in 1974) (Savard *et al*., 2006: 101). In Trail, 'fugitive dust' (Goodarzi *et al*., 2006: 253) from the Teck Cominco smelter also results in the deposition of arsenic, cadmium, copper, mercury, lead and zinc. Metals are also 'residential soil remediation' and encouragements to children to 'wash their hands after playing outside to reduce lead exposure' (British Columbia Ministry of Environment, 2009: 2–3). Manyfoldedness proliferates. Rubbish electronics' more-than-urban geographies are a site multiple. Neither one nor fragmented, it is patchy and clashy, yet hangs together.

Conclusion

In this article we have come to urban studies through the topic of rubbish electronics as our vehicle of exploration. By thinking and working with the concept of the site multiple we have composed different synopses of cities: urban enclaves of the FIRE economy are also industrial waste producers; peri-urban industrial zones are also managers of brands, legal liability and corporate public relations; and cities off the map are also urban innovation systems, while waste is rekindled as value and accumulated as poison. These are compositions, urban orders assembled from rubbish electronics and our research on their geographies. In mapping these geographies we have travelled to several cities in Asia, North America and Africa. Yet we have done so without recourse to analytical categories such as North/South, first

world/third world, core/periphery, global/local or their cognates. Our approach is experimental, seeking to add a thinking technology—the site multiple—to the methodological toolkits for exploring cityness, for doing international comparativism (Robinson, 2011). Our emphasis is on assembling and composing (Latour, 2005; Latour and Hermat, 2006) cityness while also being attentive to its other-than-urban or more-than-urban geographies. It is for these reasons that we believe that working with the site multiple adds productively to the conversation about cityness occurring at an intersection where Bunnell and Maringanti's (2010) cautions against metrocentricity and Roy's (2011b) alternatives to subaltern urbanism and critique meet. The site multiple helps us follow the action that generates cityness and its other-than-urban or more-than-urban geographies: as brominated flame retardants become air-, water- and blood-borne toxins; as heavy metals from rubbish electronics settle on children in Trail, BC, but not for the same reasons that they do so on children in Agbogbloshie, Ghana, of what relevance is 'the urban'? Trail and Accra are part of cityness and they are other-than or more-than this also. The site multiple helps us come to grips with such manyfoldedness.

As a methodological sensibility the site multiple helps attend to these more-than-urban or other-than-urban geographies that may also comprise cityness and its patchily distributed non-coherence. What the analytical device of the site multiple, with its boundaries and edges, allows us to do is to keep following the action and make our research practices relevant to the manyfoldedness of grouping, separation, transformation, difference, contact, adjacency, laminarity or friction—among other possibilities—of that which we study. Rather than vanishing points or that 'to which we must constantly refer, but that which can never be reached' (Roy, 2011: 235, citing Mouffe), the site multiple and its boundaries and edges offer us arrival points. In lieu of infinite regress, they offer us ways to keep going without presupposing inherent directionality (Lepawsky and Mather, 2011) or essential specificity, yet without having to do away with directionality or specificity as such.

The site multiple is not a theory. It is a methodological sensitivity. It helps compose synopses, not totalities; it helps generate knowledge as partial and situated as any knowledge must be. It is a composition, not a critique. Too often critique is synonymous with debunking. It relies on a gesture of unmasking in which the real (as it is claimed by the critic) is revealed behind the fetish of the mere believer. Yet, if one of the general lessons of critical social science over the past 20 years is that *all* knowledge—whether it is generated by anthropologists, biologists, chemists, computer scientists, engineers, geographers, historians, mathematicians or sociologists (the list could go on)—is partial and situated (i.e. constructed) then critique is no longer enough if it understands its main duty as drawing back the curtain of the fetish from the real (Latour, 2004). Critique performing such pretensions forgets its own lessons. If everything is constructed, then it is not enough to perform an analysis whose ultimate gesture is, in effect, to say, 'See! It (Capitalism, Science, Technology, Power, The City...) is constructed!' Yes, they are constructed. But so is all of our knowledge about them, including our critiques of them. So constructedness does not differentiate 'our' critique from 'their' fetish. We need different moves. The site multiple is a possibility. Rather than critique, it helps us compose. Rather than testing the reality of a proposition on the grounds of whether it meets the criteria of fact (not constructed, therefore true) or fetish (constructed, therefore false), we can gather to ask an entirely different question: since everything is constructed, how well or badly constructed is that which concerns us (Latour, 2004; Latour, 2010)? The construction of urban worlds collects us together in ways that pose urgent questions: What is the urban made up of? What sort of urban worlds do we want? How can we coexist? What grouping(s) are we part of? No one yet knows the answers to these questions, and finding answers to them is more than mere academic exercise. Doing urban studies with the analytical device of the site multiple

may help those of us concerned with the matter of cityness to compose relevant responses to these urgent questions.

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