Contents

Essays and Interviews

Review-Essay

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Who Carries the Weight of Digital Technologies?
What is its Weight Anyway?

Josh Lepawsky: Reassembling Rubbish: Worlding Electronic Waste. Cambridge: MIT Press, 2018, 222 pages, Paperback 24,41 Euro, Hardcover 65,72 Euro.

When opening a book, many readers are keen on seeing how an author finishes his or her thoughts; they want to get an idea of where the text in front of them will lead them. On the last page of his book, this particular author confronts us with a set of rather unusual questions. "How will we keep electronics going", he asks. "*Should* we keep them going? If so, who and what must be considered; that is, whom and what do and should we care about and care for?" (Lepawsky 2018: 178)

"Reassembling Rubbish: Worlding Electronic Waste" (2018, MIT Press) is the new book of Canadian geographer Josh Lepawsky, and (as we can see above) it promises a radical perspective on the ubiquitous electronic gadgets and their industries. Lepawsky is a key author in the field of discard studies (closely linked with waste studies, see the intro to this special issue), where systems and infrastructures that drive wasting practices are put centre stage. It is a critical field of studies. For almost a decade now, Lepawsky has published various articles on waste-related topics – on matters of electronic waste (known as e-waste), and beyond. *Reassembling Rubbish* (or RR) is his most comprehensive take on the global issue of e-waste. It comes with a plea for a new kind of politics, and it tackles fundamental ethical questions (most importantly: what is the right thing to do with e-waste?).

The discussion about e-waste in Europe is still in its infancy, especially when we compare it to the numerous books and articles that discuss the information economy via themes such as Big Data, Artificial Intelligence (or AI), and automation. This is a pity, because Lepawsky shows us that we can learn more about these very things through the lens of discarded electronics.

In what follows, I will first introduce the author's theoretical and methodological approach (the way in which he makes sense of the world and uses empirical data), to then shine light on Lepawsky's key arguments. Crucial bureaucratic debates, the criminalisation of people of colour, the public's obsession with illegal exports, the questionable focus on post-consumer waste, and (most importantly) the toxic outputs of mining and production systems are some of the themes that are discussed by this author. I will only be able to discuss a few of them. Lepawsky dismisses various stereotypes surrounding discarded electronics – stereotypes that in part also haunt critical debates among the left in Europe – to then present us with more sophisticated data and a different approach to e-waste. This is the most important contribution that merits a review, last but not least because it indicates a particular kind of way of doing social science research. I will come back to this in the conclusion.

1. Engaging with science and technology

For readers not familiar with a particular line of thought, this book's title (both the main title as well as the sub-title) might be confusing, perhaps even unattractive. What does "reassembling [rubbish]" mean, and how does it relate a "worlding [of electronic waste]"? Lepawsky's choice of words is inspired by research in the field of Science and Technology Studies (STS); in fact, *Reassembling Rubbish* also works well as an alternative introduction to the basics of STS.

STS is an interdisciplinary field in which a new perspective on science and technology is championed. In German speaking countries (where this journal is based), most scholars are aware of a few key figures of STS (such as Bruno Latour), but the field has more to offer than what is often associated with single iconic individuals (and their eccentricities). Key to

Stefan Laser

the STS perspective is a closer engagement with the ways in which science and technologies are brought together, challenged or readjusted, while at the same time studying how people are moved, infrastructures are built, and hierarchies inscribed. By questioning sharp boundaries between nature and culture, or to use some examples: by interrogating the entanglements of a machine and its users, an industry and its infrastructure, a genius and an invention, plastic waste and the ocean, and so forth, fundamental questions about knowledge and knowing are put forward, all closely linked to the issue of social order.

STS first and foremost means developing and 'exploiting' innovative methodologies. Empirical research, theoretical investigations, and a critical reflection on one's own position go hand in hand. This is not to say that there are no sharp distinctions to be found (in fact, there are plenty of dualisms that have major consequences, especially when it comes to waste), but one obtains from starting one's analysis with a narrow set of categories. This is about preliminary decisions that (implicitly) drive one's analysis. In STS, knowledge is thus understood as a situated practice that has a history – that is often full of irregularities, disputes, and things that are forgotten. Scholars here try to develop descriptions that make a difference. Understanding e-waste then also requires digging into the historical remainders of discarded electronics.

Lepawsky emphasises that today's usual treatment of e-waste (in most countries) is characterised by a narrow framing. Only a small set of specific problems informs what the 'e-waste issue' is about, which also prioritises a particular set of solutions and a stabilisation of fierce hierarchies.

In chapter 3, he, for instance, introduces the captivating story of Joseph Benson to illustrate this argument. This Nigerian citizen was the first person in the United Kingdom, we learn, who was convicted of illegally exporting toxic waste (in the form of discarded electronics). This case first of all stands out because a ruling judge justified his decision by mobilising intergenerational justice – illegal exports of waste were described as "quite serious for society as a whole" (see RR: 50) – because of their environmental damage and long-term effects. This case, however, also sticks out because we can learn how crucial it is to decipher the practical work of formalisation practices. Lepawsky unravels competing ways of regulating discarded electronics. Benson's rather small warehouse in East

London got into trouble because it shipped a container to Lagos – and the container's contents were defined as hazardous waste. This was possible because the judges drew on a particular choice of legal documents and frameworks (from the EU, OECD and the Basel Convention), in which waste is mostly framed as a 'post-consumption' issue. Simply put, a focus here lies on how to treat discarded items. Lepawsky emphasises that it would also have been possible to embrace the Bamago Convention, a treaty that was signed by a number of African states to which Benson's shipments were heading, a treaty which allows for an alternative interpretation. Instead of putting the focus on post-consumer recycling, it appreciates waste prevention. The defendant himself framed his exports as deemed for repair activities – preventative measures, as it were.

To enable or support such alternatives, Lepawsky then wants to "make e-waste strange again", what he (also drawing on literary studies) calls "defamiliarization" (RR: 4). This move is very STS-ish. Up until the 1990s, the author shows, e-waste was found to be a problem mostly because of its hazardous ingredients, which were piling up in landfills. Then, it was 'discovered' as a valuable resource that could be reworked by 'professional' recycling machinery, that is, by energy-intensive shredders, smelters and refineries. This should be embraced, it is usually claimed, instead of the 'informal' solution that used to be (and still is) quite common in the Global South (see chapter 5, where he shows that environmental NGOs are also part of this problematic framing). We usually hear very little, Lepawsky then argues, about these 'informal' actor's skills, and, critically, we also rarely speak about toxic spill-overs during the production of electronics, which indicates a major problem to which I will return below.

STS scholars also embrace a non-reductionist reasoning (Law 2004). There is a general scepticism against powerful concepts, because they might be seen as driving one's analysis, thereby leading to blindness or overseeing particular actors and their realities (often suppressed ones). It is against this backdrop that Bruno Latour (most prominently) argued in favour of a new key term for the social sciences: reassembling (Latour 2005). Societies (or collectives, as Latour would say) hold together and are moved by complicated socio-technical assemblies: by concrete infrastructures, one's work routine, daily stories in the newspapers, that telephone call three years ago, etc. This intricacy is also the reason, it is argued, why societies

Stefan Laser

are in constant state of *reassembly*. And social scientists as well as activists are said to take part in this reassembling; they, in fact, should do this more actively – which is also what Lepawsky means when he captions his book with the notion of "reassembling rubbish". Again, very STS-ish. This emphasises Lepawsky's main goal: striving towards change – a different way of framing and dealing with waste and wasting practices. Theoretical and empirical reflection go hand in hand.

Note that the author does not focus on abandoning waste altogether (what some call 'zero waste'). Even if we were to stop producing electronics from now on, there would be waste to process, and production systems to rearrange. What we need is a different "worlding" of (e-)waste, new knowledge and new framings that enable alternative wasting practices. Drawing on Maria Puig de la Bellacasa (2017), worlding, then, is, in a nutshell, Lepawsky's normative claim. While unravelling empirical details, he shines light on the dynamics between "is" and "ought". In his own words: "How we world a problem like e-waste matters. Particular worldings make some proposals for solutions thinkable and, at least potentially, actionable." (RR: 6) Additionally, and crucially, as the author shows by engaging with the 2015 Conference of the Parties to the Basel Convention (on the Control of Transboundary Movements of Hazardous Waste and Their Disposal), today there are competing and "incompatible" worldings. This is a situation from which powerful actors are able to benefit (i.e., manufacturers, particular traders). Some actors (such as Benson) have to carry the weight of decisions that are to be made. What counts as waste counts, while a new political geography could help the push for change.

2. Towards discardscapes: mapping discards, enabling a change

Based on his previous research, Lepawsky was already well established as a scholar who critically explores the geography of e-waste (e.g., Lepawsky 2014; Lepawsky and Mcnabb 2010). Chapter 4 of this book, following his previous studies, charts the global flows of e-waste and provides us with some updates. Against this backdrop, I can also now move to what I see as the most important contribution of this book.

Many people seem to know how the global flows of e-waste are shaped. In the past two decades, the e-waste issue was framed as an issue of global injustice, highlighting shipments from the Global North to the Global South (which is why Benson's case mentioned above was discussed so vividly in the media). However, Lepawsky has had a closer look at key data that is available (provided by the United Nations Commodity Trade Statistics Database, examining scrap imports that a given territory reported). Most of the public discussions turn out to be too simplistic.

During the period of time studied (1996–2012), the overall flows of e-waste rose significantly. This is not a surprise. Nevertheless, unexpected things then surfaced. The global flows of e-waste are not dominated by countries from the Global North (even during the 1990s they did not make up the majority). Instead, most of the e-waste comes from, *and* flows to, countries from the Global South. Africa, Lepawsky for instance shows us, is a net *exporter* of e-waste (RR: 77) (Asia is a net *importer*, yet there is also plenty of international trade among countries in Asia). Even countries with low labour costs and low environmental standards (like Sudan) are net exporters of e-waste (RR: 78; check also Minter 2013). This is an example of a powerful descriptive finding. There is no simple dumping story to be told, especially based on the most recent data.

Apart from in-depth statistical analysis, the author here also uses ethnographic insights to underline his argument. They turn out to be rather short and anecdotal, but the encounters help to broaden one's mind. There is other waste scholarship that draws more heavily on ethnographic perspectives, but for this particular author it rather works as a tool to unsettle the readers in a productive way. Brevity, thus, is key to make turn the readers themselves into investigators. Lepawsky, for instance, reports from a visit to Agbogbloshie, an infamous e-waste recycling site in Accra, Ghana, which is constantly making the news as a 'high-tech hell' or a 'digital dumping ground'. The much-discussed movie *Welcome to Sodom* (2018, Camino) is the latest example of this doubtful fame (critically engaging with this: Oteng-Ababio and van der Velden 2019). In Agbogbloshie, Lepawsky indeed came across materials being burned – what some describe as 'hell'. But he first and foremost met technicians and was baffled by their skills (e.g., building new computers out of dispersed materials). The author here joins other scholars who creatively discuss the potentials

of repair thinking (Jackson 2014; Sormani, Bovet, and Strebel 2019). Yet there is more to this than simply supporting repair. Hence Lepawsky's transitional conclusion: "if equitable solutions to the e-waste problem are to be devised, then issues such as livelihoods, toxic risks, access to technology, pollution, learning, and enskillment need to be carefully examined together in their tangly knots and not as if they subsisted in isolation from one another." (RR: 90)

Chapter 6 – perhaps the most original chapter – presents the reader with "Weighty Geographies". It starts with a major problem of current discussions surrounding digital devices. It often *still* seems as if digital technologies are weightless and placeless (RR: 129). This is just wrong and misleading; here, waste scholars such as Jennifer Gabrys (Gabrys 2011) remind us of the dematerialisation narratives that are essential to this. Digital technologies rely on voluminous assembly, infrastructure and recycling networks that produce vast amounts of waste and various harmful consequences. Besides, Lepawsky underlines, most of the hazardous discards in fact materialise before any consumer gets hold of (or even thinks of) buying or using or disposing of a device. Therefore, "discardscapes" are introduced. This is one of this book's most important contributions. New data and visualisations enable a thorough discussion of the weight, as it were, of digital technologies, which includes a perspective on whom is carrying it as well.

Lepawsky differentiates between "minescapes", "productionscapes", and "clicksscapes" to map the impact of extraction, manufacturing and the use, as well as the disposal of, electronics (see RR: 131, for a succinct introduction). Drawing on insights of Discard Studies (Liboiron 2018; MacBride 2011), he uses his representations to make the tonnage, toxicity, and heterogeneity of e-waste comprehensible. The author here succeeds in putting forward critical data that indeed might be helpful in reassessing the e-waste issue – for a variety of actors and their struggles. I will briefly introduce one example for each of the 'scapes'.

Lepawsky first leads us to "minescapes", with the help of a visit to a field site: the "Lavender Pit", a copper mine in Arizona, USA, that was shut down in the 1970s. The author uses this example because copper, first of all, is a critical material for electronics. But he also refers to it somewhat metaphorically. A mine closed while the demand for electronics began rising.

This is at least how the official story goes, for instance told on an information plaque at the Lavender Pit site. In reality, however, this mine was still in operation up until the 2010s. Leakage had to be managed, and creative leaching processes were used to recover remaining copper out of the local waste (RR: 138) – producing even more waste. The amount of waste a mine produces is insanely high. Data show that "the annual average of waste generated from the Lavender Pit mine before it closed exceeded what the UN StEP [United Nations Solving the E-waste Problem Initiative] estimates was the total amount of e-waste arising in the entire United States in 2015." (see RR: 139) Yet, there is a crucial difference. The mine's waste is more toxic, while some of its waste is also regulated in the form of a commodity, so that it can be shipped transregionally and globally. This is an example where Lepawsky makes e-waste strange again. Things appear in a less familiar form, and new geographies are exposed. What is special to this perspective is its focus on particular data and their effects.

For "productionscapes" I would like to highlight a different finding, even though it touches on a similar message. Simply put, it centres on the following. "Postconsumer recycling cannot cancel out emissions released in production, transport, and use." (RR: 143) Therefore, Lepawsky, for instance, provides bar charts for different gadgets (phones, laptops, tables), and the relative amount of greenhouse gas they emit during recycling, transport, use, and production. Apart from some exceptions such as the Fairphone 1 smartphone or a laptop by Dell made from recycling materials, it is the production side that dominates these charts (see figure 6.6–6.8, RR: 143–146). An iPhone 7 produced by Apple, for example, emits 78% of 'its' total greenhouse gases during production (use: 15%, transport 3%, recycling: minimal). There are laws which try to tackle this, such as the EU legislation restricting the use of hazardous substances in electrical and electronic equipment (known as RoHS), but much more is required, as the author underlines.

With "clicksites", the author finally puts the material infrastructure of the Internet to the forefront. If we discuss themes such as Big Data, AI and automation, this perspective still is underrepresented. One compelling example here is the marine world of undersea cables. Statistics show that the cables laying on the ground stretch over one million km (RR: 154). And most of these cables will stay there, even if they are used for about 25

years (when properly maintained). Although these cables are not necessarily emitting toxicants, a focus on these things helps explore the seas in a fresh way. On the one hand, they are colonised by marine life and provide a space for living, while on the other hand, some companies envision setting up extensive recycling schemes to capture the valuable stuff of the materials. What shines through is a politics of energy residue. Ever greater amounts of energy are spent to increase the energy expenditure of certain industries. Excess (Bataille 1985) appears to be at the heart of these geographies.

3. Decriminalise, democratise, degrow

So what is the right thing to do with e-waste? Lepawsky concludes his book with a list of concrete next steps. The collection of approaches that is presented, I think, signals a will to be compatible – the possibility to make use of (say) a particular discardscape in a new report of your liking. From my point of view, the most crucial arguments here are a) efforts to decriminalise the export for reuse, repair and upgrades; b) sketches for a democratisation of the electronics industries' energy use; and c) a plea for degrowth. All of these arguments are then arranged to foster a politics of waste prevention, and they all underline a move away from putting the responsibility on individual consumers (or individual 'informal' recyclers from the Global South). After all, a lot is at stake: reducing the overall amount of toxic waste, while also tackling inequalities that are inscribed in the global recycling industries of e-waste.

This book's aim is to enable a new way of knowing electronic waste; therefore, it delivers refined knowledge and plenty of data with which to engage. Here, one has to situate this publication in the interdisciplinary field of waste and discard studies. On the blurb of Lepawsky's book appears sociologist and waste scholar Zsuzsa Gille, a key source for Lepawsky (see Gille 2007). She praises this book as a "game-changer". I'm not sure whether I agree with all the implications of this well-known yet somewhat extravagant statement. However, twisting this notion helps us to understand how this field of 'studies' operates, and what Lepawsky's role in this is. In the last two to three decades, the social sciences witnessed

the birth of several 'studies', just as there were numerous so-called 'turns'. This indicates that scholars constantly rearrange their theories and tools while encountering particular empirical settings, and also while constantly bringing a new set of actors together. The world is dynamic, and so should be our concepts. This is a sign of a social science that refuses to act as if it can keep a distance, without having to reconsider its modes and ways of thinking. Key to the 'game' of studies (waste studies too!), is to change and adapt, and Lepawsky succeeds in taking part in this game. For scholars doing research in this field, he illustrates how to proceed – namely that, indeed, proceeding is a crucial means for this kind of research. It is not enough to find out (and criticise) how waste is produced and dispersed in a particular setting. New perspectives, new practical approaches are required to contribute to the way in which waste is handled. Part of this is thinking about how to convey one's intervention, an idea with which I would like to end this review.

As a fan of Open Science and its ethics of democratisation, I like the idea that you may access the key take-away messages of the book by navigating to the website www.worldingelectronicwaste.xyz. There you can find all the illustrations used, and extra "online" figures, in which you can 'zoom in' and 'zoom out' to get additional information. So go there and make yourself acquainted. While (as indicated above) the author's STS writing style might at times challenge and provoke some readers, this website functions as a compensation, and I sincerely hope other scholars also supplement their book projects with a custom-tailed web-platform. It is a bit ironic, however, that the WWW, digital infrastructures and electronic devices are needed to displaying these infrastructures' and devices' very own foot prints.

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Stefan Laser

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