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## Repair, recycling and waste

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Given the vast range of practices, the widely varying quantitative and qualitative scale of materials, and their diverse temporalities – from extraction of resources, processing and manufacture to use and reuse of objects before they become waste – it would be unrealistic to contemplate a global history of repair and recycling techniques without going into the fine detail of the nature of the operations involved and the environments in which they take place. Our aim in this article is rather to point to the key stages in the development of some of the main lines of thinking and practice that make repair and recycling sociotechnical systems of waste management.

Yet such a history cannot ignore the nature of the substances and materials incorporated in the composition of objects, nor waste in its material form. Up until the early 19<sup>th</sup> century, artisanal and industrial economy was essentially organic (Barles 2005). The manufacture of materials produced no or very little non-degradable waste. Systematic recovery was an integral part of a small, circular local economy (Guillerme 2007). To cite one key example, animals were abundant sources of additional materials, providing substances that could be processed to produce objects and foodstuffs. Their final remains were rendered into tallow and lard. Their dung was incorporated into manure. Their urine was used in dyeing. The fluids that could not be used were drained into waterways and absorbed by the soil. The last fumes were taken away by the first wind. The final deposits, rubbish dumps and tips, provided a few more – admittedly limited – resources on which those excluded from consumer society, reduced to feeding and clothing themselves from its scraps, survived (Strasser 1999).

The combined triumph of the mining and synthetic chemical industries at the turn of the 20<sup>th</sup> century led to a major transformation (Homburg and al. 2011; Bernhardt and Massard-Guilbaud (eds.) 2002). The coal economy and the kind of organization it fostered, the extraction and processing of metals at high temperatures, and the subsequent introduction of synthetic materials such as plastic into routine use, meant that extractivism, productivism, consumerism, pollution and waste management were inextricably linked (Le Roux 2011; Amter and Ross 2010). Ever increasing areas of land became saturated with the by-products of the mining industry, and later with substances generated by synthetic chemistry and its disposable objects (Jarrige and Le Roux 2017). Improvements in efficiency and technical performance led to a substantial increase in production, and came to represent the promise of increased standards of living and comfort. Economic growth became established as the dogma of human progress, and rationalization was the means of achieving it. Waste now consisted of the excess substances generated by industrial production (Le Roux and Letté (eds.) 2013).

### ***Homo faber entangled in waste***

Repair and recycling are two responses to one of the central questions for *Homo faber*: how to use objects or materials that are not quickly replaceable until they are completely worn out. These are ancient practices, but the problematization of them – in other words, constituting them as a subject of technical, political, economic and legal consideration – is recent, and inseparable from industrialization and mass consumerism (Lupton 2011). It is the appearance of new materials, mainly plastics, and the proliferation of objects, particularly new technology, that pose a problem by generating waste that cannot be reused, or can only be recycled in specialized industries (Russel and Vinsel 2020).

The industrialization of production and consumption intensified over the 19<sup>th</sup> century with the rationalization of the world economy. Its corollary was the invention of waste (Barles 2005), as it shifted from ‘transitional state of matter’ (Monsaingeon 2017: 49) to ‘waste object [that] persists, takes up space, is potentially toxic and is not necessarily decomposing’ (Larroque 2013: 4). The production infrastructure of the heavy industry of this period required massive structures, in terms of both buildings and machine tools. The technical specialization of these structures substantially limited the potential for repurposing them when they ceased to be used for their original production. Their massive scale meant the costs of demolition and securing them were high, to the point where simply abandoning them seemed a possible solution. Thus arose the problem of industrial wasteland, which may offer precious archaeological remains and scientific resources (Fluck 2017), and in some cases aestheticized cultural monuments (Tornatore 2004), but is also a source of lasting pollution, whether visual, of the landscape, or other. Where products are concerned, waste derives both from the processing of materials and from the obsolescence of the manufactured products generated. Made up of composite, artificial, and more recently synthetic materials, these products are characterized by increasingly long material existence compared to their ever shorter period of use.

Throughout the world, whatever the cultural context and the industrial system, whether or not recycling facilities exist, the management of waste objects is a major socio-economic issue (Porter 2002). These objects are circulated and exported. They are exchanged in the play of global trade, the international organization of labor and its power relations. At other times they stay in the same place, breaking down more or less slowly. There are countless technical and legal measures designed to confine and control them, and make them safe. At the level of humanity, these questions arise from the entanglement of things and human societies. Archaeologist Ian Hodder describes this interdependence as a sort of material, social and environmental trap in which human beings have become mired over centuries (Hodder 2014). The model of exponential growth embarked on thousands of years ago, and engaged with particular intensity since the 19<sup>th</sup> century, still dominates. Hodder believes the movement is irreversible, notwithstanding the now widely recognized consequences for the climate.

### .....Saut de colonne.....**Geographical differences in the culture of waste**

The distinction between what is waste to be disposed of and what can or should be recovered, repaired or recycled partly derives from systems of cultural and social reference that have long been studied by anthropologists and archaeologists (Douglas 1967; Thompson 1979; Rathje and Murphy 1992; Douny 2007). Nobody accepts the other’s waste, which is to be removed and kept out of

reach of the senses. Our own waste is discharge that needs to be hidden. It materializes separation from lost objects that are to be mourned. Rejects represent an economic loss when they generate additional production cost. For the manufacturer or industrialist, they are evidence that technical efficiency, if not lacking, can at least be improved. For the user, obsolescence and uselessness are a guarantee of waste that the waste object once again makes concrete. Hence the imperative to get rid of it as soon as possible, in order to return to calmly producing and consuming.

But the cultural aspect of our relation to the material world cannot be isolated from historical, technical and economic realities: ‘The richer a society is, the more it piles up waste and processes it industrially; the poorer it is, the more it recovers it and processes it manually’ (Droulers 1986: 62). While this observation is no longer new and needs to be qualified, it does express the reality of differentiated perceptions and practices with regard to waste on the global scale. This geographic and cultural contrast between rich and poor countries, which correlates with a global north/south division, has to be articulated with another historical and technical division in a way that generates certain paradoxes: although it would be logical for a technologically advanced society to move toward the dematerialization of certain goods and thus to produce less physical waste, the opposite occurs. The rich countries exploit the raw materials of the poor countries, particularly for ICT (information and communication technologies), and send back used manufactured products, along with their trail of pollution (Dobré and al. 2013; Flipo 2014; Bihouix 2019). Yet the formal and informal practices of composition and recomposition of materials, of repair and recycling, of appropriation and functional redeployment of commodities, limit the circulating mass of objects that are too rapidly rejected and thrown away. Not enough, however, since the global accumulation of them continued to increase with the emergence of consumer society. Since the Second World War, the systematic use of container shipping and the floating rubbish dump has reinforced the logic of a seemingly inevitably continuous expansion of waste (Veltz 2017). A sort of planetary metabolism generates and digests this mass of substances, materials and equipment in cycles of use and reuse, ending in the excreta of the hyperindustrial society (Alexander and al. (eds.) 2016).

The informal economies of poor countries recycle some of the West’s waste. They deploy extraordinary ingenuity in re-appropriating and reinventing objects and materials, to the detriment of their immediate environment (Fanchette 2016). In poorly industrialized countries and very unequal societies, necessity knows no law. Traditional recycling remains the rule, in the sense that it continues to predominate in a set of individual and collective practices determined by people’s standard of living and their access to international distribution networks. At the level of practices, however, the reuse of common objects, repaired or not, remains a very widespread mode of appropriation and consumption. To take the example of plastic, bottles made of PET (polyethylene terephthalate) are recovered in sub-Saharan Africa for reuse on the petrol black market, particularly in Benin with ‘kpayo’, low-cost petrol smuggled in from Nigeria (Agossou 2004). In Egypt this same material generates a multiplicity of practices and raises critical economic and social issues (Desvaux 2014), whereas in France, legislation aims towards elimination of disposable PET ware<sup>1</sup> by 2020, and requires companies henceforward to provide reusable cups with a deposit, in order to overcome the effects of this ban<sup>2</sup>. These different approaches to the same problem are each set within their own particular node of the problem of waste that affects the whole of the modern world, but it would be wrong to interpret them uniformly as a continuation of traditional uses.

### **The great recycling: From extraction of materials to incineration of objects**

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<sup>1</sup> <https://www.economie.gouv.fr/entreprises/gobelets-en-plastique-interdits-au-1er-janvier-2020>

<sup>2</sup> [https://gobeletsgreencup.fr/concept-gobelet-recyclable/demarche-gobelet-plastique-reutilisable/;](https://gobeletsgreencup.fr/concept-gobelet-recyclable/demarche-gobelet-plastique-reutilisable/)

[https://espritplanete.com/?gclid=EAIaIQobChMIssqFkYue4AIVDETTCh3hrq5IEAMYASAAEgKA3fD\\_BwE](https://espritplanete.com/?gclid=EAIaIQobChMIssqFkYue4AIVDETTCh3hrq5IEAMYASAAEgKA3fD_BwE)

Before any repair or recycling comes the extraction of the resources needed to process materials and manufacture goods for sometimes transient uses. Each stage of this process involves an amount of fossil fuel, but also of substances extracted from underground, either directly in the form of materials that go to make up the finished product, or for the machines used in its manufacture and distribution (Bednik 2015). Processing of materials is the first and largest source of the waste known as clinker, a term designating both the residues from manufacture of substances at the start of the cycle and what remains after incineration at the end of the chain of production of consumer objects made from those substances. Removed as the residue from industrial roasting ovens and domestic and urban waste incinerators, clinker is stored to await either potential reuse or final rejection, permanent storage. The huge size of slag heaps, barren rubble heaps or waste tips derived from mining and quarrying testify to the volume of this waste. The blast furnaces, steelworks, metallurgical plants and roasting ovens associated with them generate clinker in their turn, symptomatic of the system. Since the 19<sup>th</sup> century this waste has primarily been used in public works, as backfill or levelling in civil engineering projects and for reclaiming land from the sea. Sometimes mixed with clay, it is used in road-building and the development of public infrastructure, to reinforce carriageways and to surface paths, roads and pavements. Its other regular use is in the manufacture of building materials, where it is ground and, with the addition of lime, compressed into bricks, shaped into tiles and various types of artificial stone, and incorporated into cements known as slag cements. Thus clinker is one of the most widespread recycled materials, distributed throughout transport infrastructure and construction.

During the first phase of industrialization the majority of clinker comprised slag from steelworks, but with consumption taking over from production, this has now been replaced by clinker from incineration. The plumes of white smoke that can be seen today on the outskirts of large conurbations in Western countries usually derive from the generation of power or heat, or from plants processing urban and domestic waste, rather than from factories processing raw materials as they would have a century ago. This is the result of deindustrialization, which began in the late 1970s, and has been accompanied by the relocation of centres of slag production – coking, steelmaking, metalworking and primary processing industries (Altena Bert and Van der Linden (eds.) 2003). With the environmental turn that goes along with it, deindustrialization has paradoxically intensified people's refusal to continue putting up with the excess from any industrial activity that still continues locally, as well as that of the past whose consequences are no longer in doubt. Combating pollution, risk and dangers to health has become a key issue, a focus of conflict (Pellow 2007). Debt, or the legacy of industrial history? Never mind, waste must disappear or be confined by technical and legal measures. Hence the desire to limit its production upstream, which repair and recycling promises to make possible.

### **Reuse: An anthropological necessity?**

Today as in the past, common sense seems to determine the solution, whether that be reuse, recycling or upcycling, incorporation into new products, or intelligent recycling, the organization of a technical metabolic system in which everything, or almost everything, is assimilated within a cycle of energy and materials that it is hoped will be virtuous (Erkman 2000). Thus repair and redeployment for other purposes are broadly taken as read, even if not yet systematically implemented. To recycle an object is to transform it into a raw material destined for a new function, for the manufacture of other goods or the provision of materials that can be resold. To reuse an object is to re-employ it for the same or similar function, if necessary after repairing it. Extending its use – sometimes by adapting the way it works – means delaying the point when it becomes waste. To give an outline chronology, the global evolution of the problem can be summed up thus:

in Europe, before the ‘birth of consumption’ (Roche 1997) and before the industrial era, repair and recycling were integrated into the routine operations of everyday life, which were determined by the available resources. Depending on the relative abundance of a given material or foodstuff, societies would limit the use of them. They reused worn objects and recycled food and bodily waste. A useful object was not abandoned until it was absolutely impossible to use it for its original purpose. Archaeology offers evidence of repairs designed to prolong the use of objects despite physical deterioration,<sup>3</sup> and of multiple reuse, for example in architecture (Bernardi and Dessales 2017) and other domains.<sup>4</sup> What cannot be repaired is recovered by ‘freelancers’, the rag-and-bone men who are key figures in the life of preindustrial cities (Florin and Garret 2017; Droulers 1986), to the point where they are now organized in the Global Alliance of Waste Pickers.<sup>5</sup> Collecting rubbish is once again becoming a job, a profession, and gleaning continues as a method of survival in some contexts (Silguy 2009). From the 19<sup>th</sup> century on, these practices formed the basis for the artisanal and industrial waste recycling sectors, which are now concentrated in the hands of a few corporations that have built whole economic empires (Bertolini 2008; Lorrain 2001, 2002; Anstett and Ortar 2017). Thus waste materializes huge global industrial and financial stakes in the world economy, working in support of the global pursuit of productivism and consumerism by other means. It also acts as the focus of local resistance to the constraints of Western capitalism, based as it is on the quest for perpetual economic growth.

### **Built-in obsolescence of products**

Contemporary waste is set within a paradoxical temporality: the durability of industrial materials could have made it possible to slow down the rate of production, by extending the life of products. But while materials take centuries to decompose, objects are now only used, or even usable, for a few years (Larroque 2013), justifying, for industry, an exponential growth in the volume produced. Mass consumerism, as it has developed since the 1960s, is based on the principle of not repairing objects at the end of their life; the unusable object is not repaired but replaced by another with the same function. The technical and economic conditions of production have evolved in such a way that it becomes more expensive to repair an object or have it repaired, particularly in the case of electrical appliance than to replace it with a new equivalent – even if in theory technical products remain ‘repairable’. In industrialized countries, an object is now replaced not because it is no longer usable, but rather because another has come onto the market, presented as better (or more closely aligned with the image of modernity presented by industry, marketing and the media). This change in the relationship to things represents a material revolution (Daumas 2018), and correlates with the emergence of the consumer society ‘marked by the choice of disposable and perishable objects’ (Jarrige and Le Roux, interview with Le Lay 2016). Zygmunt Bauman analyses this phenomenon through the notion of ‘liquid life’, noting the ‘reversal of values attached respectively to duration and transience’ (Bauman 2005: 83) in consumerist society, which now dominates productivist society. ‘For the expectations to be kept alive and for new hopes to promptly fill the void left by hopes already discredited and discarded, the road from shop to garbage bin needs to be short and the passage swift’ (*Ibid.*: 82). While objects from the first phase of industrialization, such as containers, laid claim to a durability and a potential for reuse that offered the possibility of a ‘life’ over centuries (Bonnot 2002), 20<sup>th</sup>- and 21<sup>st</sup>-century products have only a deliberately limited existence.

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<sup>3</sup> Examples of ceramic repairs are widespread in the archaeological literature. *Kintsugi*, the repair of porcelain with gold lacquer in Japan, is a well-known example. See also Speranza 2007.

<sup>4</sup> *Archéopage*, journal of the Institut national de recherches archéologiques préventives [National Institute for Salvage Archaeology], no. 29, 2010: ‘Recyclage et rempli’.

<sup>5</sup> <http://globalrec.org/>

While the beginnings of built-in obsolescence can be identified in the 1950s, when industry began to think of ‘the ready-to-throw-away as an engine of growth’ (Monsaingeon 2017: 143), it was theorized as early as 1932, in a pamphlet written by New York estate agent Bernard London. He invented a system of ‘planned obsolescence’ that would force consumers, on pain of taxation, to replace things once they had gone past a date fixed by law (London 2012 [1932]). According to London, shoes, houses and any industrial or architectural product should have a limited life span. In order to avoid the practices of repair and saving that had become widespread following the 1929 Wall Street crash, he recommended that the law should fix a life duration for things. The aim at this point was to relaunch industrial growth by accelerating and controlling the production-consumption-disposal cycle, in order to avoid an obstruction in the economic system.

Today this way of thinking may seem absurd, not least because it assumes unlimited supplies of raw materials. Nevertheless, it can be seen as one of the first explicit theorizations of the logic of productivism and consumerism. Eighty years on, French law prohibits built-in obsolescence, defined as ‘the set of techniques whereby a seller seeks deliberately to reduce the life of a product in order to increase its rate of replacement’.<sup>6</sup> The National Assembly has even discussed requiring products to be marked with their expected useful life,<sup>7</sup> a move that would be the exact opposite of the allotted lifespan of things invented by London, since it is intended to sanction an excessively short period of use and encourage ‘reparability’ of objects. These contrasting logics, arising within a few decades of one another, shed light on the relation between human societies and technical objects and its inevitable destiny. The comparison invites attention to the trajectory of the materials that make up the object, from extraction to transformation into their final form as waste. It is in this interval between extraction/processing and incineration/disappearance that the sociotechnical existence of objects and their constituent substances is negotiated, passing through the interplay of phases of repair and recycling. Thus neither repair nor recycling can be assumed, since they relate to an incommensurable variety of economic, technological, social and cultural contexts.

.....Saut de colonne.....**Countering obsolescence in the era of hacking:  
Ethics, value and morality**

Practices of reuse are currently the focus of renewed attention, yet the rhetoric of sustainable development struggles to translate this into concrete action. It is worth noting that the difference in scale between repair, which is practiced at the level of the individual object, and recycling, which involves the mass collection of constituent materials, results in a different relationship to things and techniques. Thus repair is often rooted in a system of artisan operations (Dant 2010), as opposed to recycling which deals with much larger quantities. There is indeed no comparison between the individual practices of keeping a compost bin at the bottom of the garden, or collective repair in a skillshare workshop, and those, for example, of the industrial sector reprocessing fuel or substances derived from the dismantling of nuclear power stations. Yet the logic is basically the same, consisting of using materials and objects to the limits of their potential in order to optimize reuse, with the declared aim of economic, social, cultural, political and environmental optimization of use. The conflicts aroused by the practices of the nuclear industry nevertheless serve as a reminder that any disused object constitutes intrinsically unstable waste, in terms of both its

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<sup>6</sup> Consumer Code, law of 17 August 2015, Article I, 213-4-1.-I. This type of obsolescence differs from London’s planned obsolescence in that it is fixed by industry rather than by the law, outside of official control and without the consumer knowing the end-date.

[https://www.legifrance.gouv.fr/affichTexteArticle.do?idArticle=JORFARTI000031044819&cidTexte=LEGITE\\_XT000031047847&categorieLien=id](https://www.legifrance.gouv.fr/affichTexteArticle.do?idArticle=JORFARTI000031044819&cidTexte=LEGITE_XT000031047847&categorieLien=id).

<sup>7</sup> <https://www.ecologique-solidaire.gouv.fr/duree-vie-des-produits-obsolescence-programmee>

physical and its socioeconomic materiality, depending on whether its existence is considered in time and space as a solution or a problem, a profit opportunity or a danger to the environment or health (Beaune 1999; Harpet 1999).

Resistance to the industrial and commercial logics of consumerism was initially organized at the level of non-profit organizations and citizen collectives. Originating in the Netherlands,<sup>8</sup> the ‘repair café’ movement offers one possible solution, offering a grassroots path of commitment toward ‘deprogrammed obsolescence’ (Goyon 2016). Along with other similar initiatives, these approaches aim to combat organized waste. This kind of laboratory of technical citizenship offers participants a direct relationship with objects, demystifying and democratizing access to the black boxes of technology. Those organizing them seek to ‘free’ objects from intellectual property, and from their functions, by insisting on recovery, reuse, local short-circuit manufacture, all within the framework of a political, cultural and social project (dissemination, facilitation, education). Repair, reuse and diversion into alternative functions are thus embedded in a movement of resistance to the dominant model of mass consumption, with ‘kludge’ becoming a mode of appropriation of objects and techniques.

What might appear a game or a way of adapting to the technical and economic constraints of capitalism is now proclaimed as a real political project. Ad hoc repairs, previously confined to poor countries and the lower social strata of rich countries, becomes an act of resistance against the dominant system. The work of humanitarian and social recovery organizations such as refurbishing centres (Messal 2014; Corteel 2016) and the Chiffonniers d’Emmaüs<sup>9</sup> (Hoarau 2009), as well as a number of similar initiatives (Anstett and Ortar 2015), sit within a similar perspective.<sup>10</sup> In France the success of second-hand shops and flea markets, which trade commercially, is part of a different way of thinking (Sciardet 2003). States and public bodies, asserting a commitment to sustainable development, also engage in recovery and reuse, through agencies such as ADEME, which offers tips on techniques and procedures designed to ‘make your objects last’.<sup>11</sup>

However, comparing these practices opens up a series of ethical questions on the values ascribed to things, objects, materials and waste in different economic and social contexts. As Martine Droulers writes with reference to Brazil, ‘burying without recycling is seen as a crime in poor countries’ (Droulers 1986: 68). Whether a material or an object is seen as waste or resource is a matter axiological and moral judgment. In India, the recycling of second-hand clothes that Westerners donated to charities into blankets for humanitarian emergencies shows how moral values, material goods and the market economy are interwoven, not without raising ethical problems around working conditions (Norris 2012). The moral values proclaimed by those who promote recycling as a virtuous resistance against waste are diminished by their social practices. In France, non-profit organizations focused on upcycling waste posit an analogy between the reuse of objects and return to employment for workers, despite the fact that ‘only a small proportion of the objects actually acquires new value by being sold, [just as] only a small proportion of the workers said to be “returning to work” actually gain employment in the regular workplace’ (Corteel 2016: 118). Similarly, in China the work of repairing and reconditioning electrical equipment in most

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<sup>8</sup> <https://repaircafe.org/fr/a-propos/>

<sup>9</sup> The ‘ragpickers of Emmaüs’, a charitable organisation, founded in 1949 to support homeless people, that collected and recycled or repaired unwanted household goods.

<sup>10</sup> For a regularly updated overview, see Elisabeth Anstett and Nathalie Ortar’s blog ‘La deuxième vie des objets: Anthropologie et sociologie des pratiques de récupération’: <https://dvo.hypotheses.org/>

<sup>11</sup> <https://www.ademe.fr/sites/default/files/assets/documents/fiche-comment-faire-durer-ses-objets.pdf> (January 2019). ADEME is the Agence de l’Environnement et de la Maîtrise de l’Énergie (Agency for the Environment and Energy Management), a government body that undertakes research, provides advice and information, and supports initiatives at community and local government level.



towns and large villages, despite the official prohibition on international trade in ICT devices, which are seen as waste in the West, forms an integral part of the consumerist industrial system, far from the illusion of a circular economy reducing the environmental impact of mass production to zero (Schulz 2016). Repair and recycling are thus never absolutely virtuous practices, but any ethical evaluation of them needs to take into account the entirety of the context, the circulation of materials and the resulting effects.

## Conclusion

Repair, recycling and waste management are bound up together. In this short article we have attempted to persuade readers that they also point to the huge variety of sociotechnical relations in the never-ending cycle of processing of substances, materials and equipment. On the basis of an entirely everyday object, it might (perhaps) be possible to envisage an analysis of all these links woven between the local and the global, past and future, nature and culture. Yet such an analysis would need to be set in the context of the forms of existence of the object in question, from extraction to ultimate decomposition of materials. Between the workshop of a Parisian car dealer and the streets of Havana, the same carburetor surely has a different story to tell. The journeys of the two relate to widely divergent ways of thinking and practices, which are nevertheless not without points of similarity. Would a global but contemporary history of techniques of repair, recycling and waste management, then, be possible? Could it be something more than a list or a catalogue of local practices and dedicated international industries?

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