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Technology as Scripting, Constructed and Relational: Three Narratives about Food Waste Recycling in Edinburgh

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> That machines make history in some sense – that the level of technology has a direct bearing on the human drama – is of course obvious. That they do not make all of history, however that word be defined, is equally clear. The challenge, then, is to see if one can say something systematic about the matter, to see whether one can order the problem so that it becomes intellectually manageable.
> (Heilbroner, [1967] 2008, p. 97).

Introduction

Technology studies as a sociological sub-discipline is quite fractured (Bingham, 1996). On the one hand, it is argued that technology is deterministic, that it influences and even controls human behaviour and progress (Bimber, 1994). On the other, theories of social constructionism seek to understand how technology is produced by all kinds of social groups, both materially and symbolically (Pinch & Bijker, 2008). Then there are studies that employ more radical philosophical underpinnings, such as actor-network theory (ANT), which chart a course between determinism and constructionism while rejecting them both (Gille, 2010). These competing theories all have valuable insights to offer on the subject of communal food waste recycling in Edinburgh.

Waste and waste management is studied from many viewpoints in the social sciences (Buckingham et al. 2005; Edensor 2005; Gille 2010), but if we take a wide definition of the term, then waste can also be considered a 'technology' (Bulkeley & Askins 2009). Contrary to common misconceptions, technologies are not only objects or artefacts, but also associated human activities and knowledge (Mackenzie and Wajcman, 1985; Bimber, 1994; Scott and Du Plessis, 2008). As such, technology is never 'invented' with a flash of inspiration (Mackenzie & Wajcman, 1985; Pinch & Bijker, 2008), but rather refigured by small modifications to existing systems and networks (Latour, 2008). In this case study, the material objects – the kitchen caddy, the food waste bin in the street – are familiar, but when combined with instructional media and expected behavioural norms and politics, they become part of a 'technology' that is new.

In taking seriously the complex assemblage (DeLanda, 2006) that is the communal food waste system in Edinburgh, this paper does not aim to present a seamless account of how this technology works. In opposition to the quote at the start, I attempt to show that there is *no* system with which you can fully understand a technology. I wish to be

explicit that any attempt at understanding is always a construction on the part of the author, and that embracing the un-manageable, un-systematic and irreducible nature of food-waste can be liberating for academic study (Lorimer, 2003).

And so, in this essay I will present three stories. All are about the same case, all come from the same 'data', but all go to show how fractured and contradictory technology studies can be. The first looks at how food waste recycling technology actively *produces* users. The second takes the opposing view, arguing that this technology is socially constructed, and exists only as an expression of social relations. The last story is one of co-construction, of technology, users and designers all constituting themselves and each other through collective action. In these stories I weave together many strands of complex and often contradictory theories: such as actor-network theory, technological determinism and social constructionism[ii].

Applying these sorts of complex theories to everyday situations has precedent: Oudshoorn and Pinch (2003) argue that technology should be studied in the context of its use, as this gives a more enriching understanding to theories of technological agency. Far from being merely mechanical or material issues, tales of technologies in every-day situations can bring up many political and philosophical questions (Phillimore and Moffat, 2004). The every-day is therefore a rich site of study, not because it is special, but because "particularity and mundanity are […] the qualities that matter most" (Lorimer 2003, p. 200).

Food waste recycling in Edinburgh

Waste has undergone a transformation in political framing during the last twenty years. The idea of 'waste' itself is relative, material that is deemed to have a lack of value (Gregson & Crang, 2010), or a residual leftover (Gille, 2010). However, waste is now seen not as an 'end-point' or thing to be gotten rid of, but an assemblage of materials that can be used and framed in terms of environmental impact (Bulkeley & Askins, 2009). As such, there has been a technological change in how we deal with much of this waste.

Most public waste disposal systems in the UK are handled by municipal authorities. Although the English and Scottish Governments set targets and overall policies, each council decides on their own recycling systems and applications (WYG Environment, 2012). Since the 1999 EU Landfill directive, there have been new targets and management devices in order to divert some biodegradable municipal waste away from landfill (Bulkeley & Askins, 2009). This requires changes in how waste is processed, collected and interacted with on many levels.

At the household level, councils need to convert non-users into users of recycling technologies in order to achieve their targets (Buckingham et al., 2005). Since Ewing (2001) estimates that only 10% of consumers are willing to make inconvenient choices, this requires that recycling collection schemes have low effort and financial costs to consumers. Councils therefore construct recycling technologies as services that everyone should use; barriers to access being the only problems to be overcome (Wyatt, 2005; STV Edinburgh News, 2011).

Against this backdrop, Edinburgh has its own targets to be met. Its fledgling food recycling trails began in 2008, and "from the end of March until June 2013, [they] are rolling out [the] communal food waster service to a further 35,000 flats and tenements across the city" (Edinburgh City Council, 2013b). The city is estimated to dispose of 50,000 tonnes of food waste every year, and so it hopes to divert 20,000 tonnes of this into composter systems (BBC News, 2010). Edinburgh City Council operates a system of communal street bins for high density living areas, and these are the areas on which this paper will focus. The food-waste recycling scheme required new, specialized street bins to be implemented, as well as kitchen caddies, compostable liner bags and promotional media being distributed to residents (see Fig. 1). This all takes place in the wider context of the councils 'Make our city Edenburgh'.

Figure 1: A promotional leaflet from Edinburgh City Council, received by the author

Method and presentation style

As I am using Edinburgh as a case to illustrate some contrasting theories which circulate in technological studies, the data I draw on is auto-ethnographic. Although it is important to look at non-users as well as users of technology (Wyatt, 2005), I acted as an early adopter of the food waste recycling service: I have a different kitchen caddy than the one provided by the service (a small swing lid bin that I purchased myself). I also had to use bins located in other streets, as when I started food recycling in September 2012, they had not been rolled out to my street yet.

Auto-ethnography and studies that are personally reflective hold a somewhat divisive position in social science methodologies (Spry 2001,). Chang (2007) argues that to qualify as auto-ethnography, research must have autobiographical content, use ethnographic research methods [iii] and use cultural interpretation. However, auto-ethnography is also a political project as much as a researching and writing practice, emphasizing the constructed nature of research, and therefore acting as a critique for the 'grand-narratives' (Spry, 2001) so often found even in critical theory (Haraway, 1991).
Auto-ethnography relies upon close personal reflection, a practice of self-narration which seeks to understand the researcher/author's relationship to the object of study (Spry, 2001). Sources for data construction can be memories, journals, interviews and pictorial documents, as well as self-observation (Chang, 2007). In this way, auto-ethnography provides an extremely 'researcher friendly' source of data in terms of access (Chang, 2007) as well as promoting a more creative type of research write-up.
The narrative style I use to present the three accounts of food waste recycling also goes towards my aim of acknowledging the existence of multiple 'truths' (Haraway, 1991). The small stories I spin here combine to show the messiness of technology: its ability to be at once constructed and constructing. In this way I wish to disrupt the 'smoothness' offered by so many other arguments (Lorimer, 2003).

This messy style allows me to blend together seemingly disparate branches of theory: scripting is included in a section with technological determinism, when in fact many would place it closer to theories of actor-network theory. Mixing theories in a way some may find uncomfortable allows me to show underlying philosophical similarities between theories, as well as avoiding the 'progression of knowledge' trope. The stories I create here are small illustrations intended to open up the debate about how technology and sociality interact.

Narrative one: Constructing users
In this story, I am taking bins seriously (Winner, 1985). The social perspective often seems to suggest that 'things' don't matter, but as Oudshoorn and Pinch (2003) argue, people are not the only actors. Far from existing 'exterior' to human society (Bimber, 1994), the communal food waste recycling technology *itself* is an agent of social change. This story provides an account of how this technology not only alters social practice, but how it constructs me as a user. In this, I do not seek to fetishize technology (Gregson & Crang, 2010), but to show how technology can be thought of as strong and independent (Mackenzie and Wajcman, 1985), with the capacity to affect human lives.

The physicality of the recycling technology affected how I dealt with household food waste. Due to its swing-top lid, my kitchen caddy forced me to get more acquainted with the food I was throwing away. I had to clean the bin more often than another design, and I had to empty the bin and re-line it on a weekly basis, meaning that I became more aware of my flat's food consumption habits and of the sticky nature of waste itself (Gregson & Crang, 2010).

This heightened awareness of my interaction with waste created a different sense of my own self. These technologies re-shaped my notions of responsibility (Bulkeley & Askins, 2009). In requiring users to interact with and sort their waste on a larger scale

than before, Edinburgh Council puts the onus on the consumer to sort and be responsible for the environmental impact of their own waste.

Figure 2: The communal street recycling bin. Source: Author

I also came into contact with waste when interacting with the communal street bin. The bin has an intricate disposal lever inside its rather small opening (see Fig 2.), designed to prevent other types of waste being put in the bin and keep it hygienic (BBC News, 2010). However, this means to get the compostable bag full of food waste into the bin you have to perform a pushing, squeezing action on the bag, coming into contact with more waste. Here we can see that the physical design of these street bins constrains the actions I may perform.

It is widely acknowledged that technology can shape the social context in which it is put (William-Jones & Graham, 2003), and at this small scale, the food waste recycling technology requires social change, it is driving me to change my behaviour through its material presence (Mackenzie & Wajcman,1985). The bin alters behaviour not just in a subtle way like a chair (Spinardi, 2013) but because its technology encompasses a directive: to put in a bag, to perform certain actions and undertake different routines(Winner, 1985; Landstrom, 2006; Latour, 2008). This phenomenon has been described in sociology as the technological 'script'. As Oudshoorn and Pinch put it; "the concept of script tries to capture how technological objects enable or constrain human relations as well a relationships between people and things" (2003, p.9). A script shapes users' perceptions of what is possible; the predicted use of the technology becomes a command (William-Jones & Graham, 2003; Lockton et al., 2008).

Figure 3: Picture of woman putting food waste in communal bin. Source: STV News 2011

In these scripts, it is not just the behaviour of users that is designed, but also the users themselves. In the designing of any technology, it is not only artefacts that are designed but a potential future and by extension a potential user (Abi-Ghanem & Haggett, 2009). Figure three demonstrates the kind of predicted user the council envisage and also provides an example of how gender is mainstreamed into municipal waste management (Buckingham et al., 2005). By becoming an early adopter of this technology, I am constructed as an environmentally minded woman, focused on her consumption habits and hygiene. In the design process, the potential user is constructed, and by engaging in the predicted behaviour, part of my identity is therefore constructed by it (Scott & Du Plessis, 2008).

In this mess of waste, scripts, and reified norms there is a kind of technological determinism underpinning the whole interaction (Bimber, 1994). This is not the kind of independent technological progress story as outlined by Heilbroner (2008), as such a viewpoint is often merely a gift of hindsight (Pinch & Bijker, 2008). This is a more nuanced version, one which underpins a lot of modern sociological talk about technology (Bingham, 1996). Technology is a real, active part of human life, affecting not only my behaviour but also my identity.

Narrative two: Constructing technology

In this story, I seek to follow those who empower not the material technology itself, but the users of technology. A huge body of work sees technology as socially constructed (Pinch & Bijker, 2008): not only by scientists and designers, but by the people who use technology (Mackenzie & Wajcman, 1985; Kline & Pinch, 1996). This becomes a story of how I make my world in the everyday, using my own agency to affect and shape technology.

Under this viewpoint, technology is viewed as a set of congealed social relations (Mackenzie, 2005). It is argued that as technology is a package of socialities, information and ordering, it cannot function on its own (Bimber, 1994; Scott & Du Plessis, 2008). This makes the social components and context of a technology key in its development.

While it can be difficult to see my personal effect on the communal food waste technology in this setting, the process of 'script-changing' can go to demonstrate the effect users can have on technology. When I began food waste recycling in September, the kitchen caddy had to be lined with either compostable liners or newspaper, but in early 2013, the policy changed to allow plastic bags to be used as liners (Edinburgh City Council, 2013a). There was no official reason given for this change, but it might point to the power of the user, as compostable bags are expensive, and newspaper linings unwieldy.

This may demonstrate that the food waste technology is in its 'interpretive stage': a stage when the use and specific form of the technology is open to alteration by its users (Kline & Pinch, 1996; Pinch & Bijker, 2008). The alteration of Edinburgh City Council's policy and the allowance of another object in the food waste recycling technology may go towards rhetorically solving this 'controversy', whereby it can be stabilized through use (Pinch & Bijker, 2008). In this way users can be said to actively construct a technology (Kline & Pinch, 1996; Oudershoorn & Pinch, 2003).

It may have been users 'digressing from the script' which prompted the change in caddy liner policy. This occurs whenever technology is used in unintended ways: although I used the caddy and bin for food waste there is nothing to stop members of the public using them for other purposes. Kline and Pinch (1996) argue that technology is often used in unanticipated ways, and this use is not 'wrong', but just different from the assumed use.

I know of users of Edinburgh's food waste recycling service who do digress the script in such ways. Friends of mine readily admit to not using bags at all, and shovelling food waste into the bin with a spoon, or using a bin key or pair of pliers to open the communal street bin in order to deposit food waste. These activities were undertaken largely because of the difficulty in using the depositing mechanism in the bin. In this respect the technology itself has not forced people to use the bins in the scripted manner. What is needed is for people's behaviour to change (Bulkeley & Askins, 2009) and only social interaction can produce this (Mackenzie & Wajcman, 1985).

Theories of social constructionism argue that technology is made by designers and users both materially and socially. Power may be mediated by artefacts (Oudershoorn & Pinch, 2003) but the role these artefacts play are merely vehicles for human goals and intentions.

Narrative three: Co-constructors

> The bizarre idea that society might be made up of human relations is a mirror image of the other no less bizarre idea that techniques might be made up of nonhuman relations.

(Latour, [1992] 2008, p. 162).

The previous two accounts are both deterministic: they hold an asymmetrical view of power when it comes to technical and social worlds (Bingham, 1996). However, configuration is a two way process: just as we configure technology we are configured by it (Oudershoorn & Pinch, 2003). Taken together, the theories of technological determinism and social constructionism are philosophically incompatible: which is why it takes a radical overhaul of metaphors and philosophical underpinnings to resolve them (Demeritt, 1994).

> One of the most popular and powerful ways of resolving the technological determinism/social constructivism [sic] dichotomy in technology studies is the actor-network approach.
> (Johnson and Jameson, 2008, p. 151).

ANT (actor-network theory) was devised in the 1980s by Law (1986) and Callon (1986) (among others) (William-Jones & Graham, 2003). It rejects the kind of essentialism and externalism present in the two previous narratives told here (Latour, 1993; Bingham, 1996). It sees no dualism between society and technology/nature, seeing the two as creating each other materially and symbolically (Law, 1992; Latour, 2008). It can thus be said to advance a *relational* philosophy, regarding entities and features such as power as the outcomes of interactions (Woods, 1997).

ANT holds that the world is made up of 'actants', and things are 'done' through connecting these actants together in a network (Latour, 1993). The stages of constructing a network are outlined by Woods (1997). First comes *problematization*, where the entities are defined, then *intressment* where other entities are attracted, then other actors are *enrolled*, and finally the network is *mobilized*. In my case study, there are many different types of entities, all playing material and/or rhetorical roles in the network (DeLand,a 2006). For instance, the street bin acts materially, as a holder of waste, and rhetorically: providing information via signs on the side. It is the collective exercising of these material and rhetorical capacities which produce the effects that are observed from a network (DeLanda, 2006).

This network needs constant effort to maintain, as certain actions are needed for upkeep and certain actors may fail to play their roles (William-Jones & Graham, 2003). The idea of technology becoming stable after an initial 'interpretive' stage (Pinch & Bijker, 2008) obscures this type of work. For the food waste recycling network to produce the Council's desired outcome, each entity needs to continue acting in a certain way, and may require upkeep to do so. The kitchen caddy, for example, needs regular cleaning to prevent waste residue from smelling or interfering with the operation of the swing-top mechanism. On a personal level, I still need to perform the recycling actions: line the kitchen caddy, put food waste in it, empty the caddy, carry the food waste to a nearby bin, and interact with the bin. There are a huge range of opportunities for these processes to break down, or the technical entities to exercise their agency and 'rebel'.

Although networks are never fully stable or 'finished', certain networks can, for analytical purposes, be treated as nodes or individual actants in a larger network

(William-Jones & Graham, 2003). However, I would argue that the Edinburgh communal food waste recycling network is not at this stage yet. The street bin's design is clearly unsatisfactory, and components of the network like the caddy liners are still being transformed, with other entities (the plastic bag) being enrolled.

There is always the possibility that certain entities will refuse to be enrolled: which may lead one to conclude, as in the second narrative, that technologies are merely congealed social relations. However, Mackenzie and Wajcman's idea that it is only society that controls our use of technology highly flawed (1985). It assumes that we are totally free in our choices, when, as Latour (2008) points out, we are only relatively free. It is true that scripts can be challenged, rejected or accepted by users, but it is still the script that has the agency in setting the terms of the conversation (Oudershoorn & Pinch, 2003). In the case of food waste in Edinburgh: many people do not behave in the way the technology intends; and they are thus constructed as 'deviant' or 'unhygienic'. Even those who are not involved with the network are affected by it: they become 'non-users' whereas previously they were simply not users (Wyatt, 2005).

The food-waste recycling technology is thus constructing users in the way it frames social life: rendering people non-users and users, deviants and conformists. Conversely, users are constructing the technology: reframing it through their 'deviant' use and in some cases prompting official recognition of these scripts. One of the great benefits of ANT is that it can respect and represent this sort of co-construction. Although it has been used in much recent materialist work to show how 'things' can exert power over others (Whatmore, 2006), its real advantage is that it can be used investigate topographies of power from many angles: demonstrating how different actors enrol other entities.

In my food-waste interactions in Edinburgh, I am rendered as a conformist. I embody the politics and rhetoric surrounding recycling schemes to such the extent that I did not wait for the council to enrol me in its scheme via the delivery of a kitchen caddy. In buying my own and connecting myself to this network forcibly, I am attempting to fulfil my own goals, enrolling a small swing-top bin which was never designed for this situation. For me, becoming a part of the communal food waste recycling technology advertises my status as an 'environmentally minded person', in touch with my consumption habits and ecological impacts.

Such a status is certainly not the sum of, but is important to, my identity. Conversely, I construct identities for the entities I interact with in this technological network: the uncooperative bins, the meaningful political intentions. I fully agree with Landstrom that "technology and humans as both products in complex processes, where identity and subjectivity are outcomes" (2006, p. 36).

Conclusion

The case study of communal food waste recycling in Edinburgh is mundane, but this makes its political implications all the more radical. As we have seen, in this everyday setting, there are messy configurations and processes weaving alongside each other: the interactions at this level can go on to produce larger narratives of environmentalism, waste management and responsibility (Lorimer, 2003).

In this paper, I have presented three ways in which these everyday interactions can be understood, each taking a different view on which entities engage in construction. In the first story, humans were rendered passive against the vibrant material agency of technological entities. In the second, it was the humans who were rebelling and altering the fundamental structure of the technology itself. In the third, humans and technologies produced each other, the focus being the context of these interactions which produce identity.

I want to stress that none of these stories is any more or less 'true' than the others. Any academic position which claims to have the 'truth' is usually a subjective political project disguised as objectivity. As Haraway (1991) argues, we must throw off such constraining approaches, and embrace the idea of multiple truths, situated and particular. However, the rejection of 'singular objective truth' does not mean that I lose all of my evaluative tools.

> The reductionist versions tell that either machines or human relations are determinate in the last instance: that one drives the other
> (Law 1992, p.382).

The advantage of an approach like ANT is that it leaves more room for constructing; its relational understandings of identity and its analysis of co-construction allow seemingly irreconcilable concepts: that of technological determinism and social constructionism to work together. Since ANT is more of an ontological attitude than a specific theory (Hitchings, 2003), it can be used to analyze many types of networks from many subject positions in order to gain an understanding of how the world is made up.

In the quote at the start of this essay, Heilbroner states that our task is to "order the problem and make it more intellectually manageable" (2008, p97). I argue that what we should be doing is embracing the disorders and co-constructions within and between technologies and socialities. ANT allows us to write more stories: messy, disorganized and subjective though these may be, they take seriously the contributions made by all entities that exist in our interactive life.

Notes

[i] This paper was published in The Undergraduate Journal of Ireland & Northern Ireland, Volume 5, 2013 and we are grateful to the Undergraduate Awards for permission to reproduce a slightly amended version here.

[ii] Due to the restrictions of this essay, I only explore these schools of thought with respect to my case study.

[iii] Ethnography is itself a diverse field of methodological thinking and practice (Bryman 2001)

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