PLATE
Product Lifetimes And The Environment

Resisting Obsolescence? The Role of a 'Culture of Repair' for Product Longevity

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Abstract: Repairing and caring for consumer goods can significantly prolong the useful life of products. So far, there is a lack of research that investigates the take up and appropriation of repair practices and their integration into people's everyday life. The paper draws on social practice theories to investigate everyday repair, examining the material, spatial, and temporal dimensions of repair. Empirical data derived from a citizen science project reveals the procedural and dynamic character of repair practices as processes that unfold in space and time.

Introduction

In recent years, repairing and making initiatives have experienced a significant upswing in many industrialized countries (Anderson 2012, Kohtala 2015). A growing number of people fix and make their own products through small-scale, decentralised workshops (Hielscher and Smith 2014). Within these initiatives, repairing and making is perceived as an emancipatory act where people claim the right, for example, to repair things, since – as the Repair Manifesto teaches us – 'if you can't fix it, you don't own it'. Initiatives enable repair of goods in local production and consumption systems; whilst culturally, practicing repair is argued to cultivate post-consumerist values through stronger associations with the objects created and repaired (Ratto and Boler 2014, Rosner 2013).

Currently, the main focus of existing research is on repair and maker initiatives as spaces of collaborative repair and making. There is little research that looks at repair work conducted in people's homes, examining how practices of repair are appropriated and integrated into people's everyday life outside the collaborative workshops. Moreover, there is also a lack of empirical evidence that our relations to 'things' change through self-repair and do-it-yourself (DIY) activities so that the useful life of products is prolonged.

Against this background the paper presents a new methodological approach to social practices of repair and making to answer two research questions: 1. How are social practices of repair performed in daily life? & 2. How do they change human-object relationships? In the following, we present some conceptual ideas and empirical findings from a citizen science project where these questions have been our main starting point to investigate repair practices.

Conceptual framing

We draw on social practice theories to examine our research questions. It draws attention to the interactions between people and their objects in existing daily routines, especially focusing on the performance of practices. These performances are influenced by people's bodies, their minds, the knowledge and competence they possess, the discourses they draw on and the emotions they feel – elements that are all interconnected (as concluded by Reckwitz 2002). In addition, they hold the practice together through shared competences, conventions and material resources as these elements exist over time (Shove and Pantzar 2007). Following Shove et al (2007), objects and individuals are not explored in isolation away from everyday life but are considered as related. Objects create networks that help to reproduce processes and practicalities of use, as they 'are not just semiotically communicative' (2007:13) in the accomplishment of practices.

Practice theories regard subject-object (people and products) relations as significant as

subject-subject relations. Warde (2005) and Reckwitz (2002) have suggested that objects have importance in that they make certain practices possible, echoing the work on the relationship between objects and people conducted by writers in science and technology studies (e.g. Latour 1992).

'Social change is a change of complexes of social practices, it presupposes not only a transformation of cultural codes and the bodies/ minds of human subjects, but also a transformation of artefacts (a relationship which deserves closer study)' (Reckwitz 2002: 213).

Objects are not only regarded as symbols but are used in motion as part of everyday practices. Bodily and mental activities can potentially be influenced through 'limitations' and 'allowances' of the materiality of objects. We used this approach to study practices of repair in three regards:

- The appropriation and integration of practices of repair into everyday life.
- The materiality, material arrangements and human-object relations that characterise everyday repair.
- The socio-spatial and socio-materiel dimensions of everyday life important for practices like repair.

Research methodology

To explore our research questions a mixed-method approach based on citizen science research was conducted in the frame of a publicly funded research project 'Repara/kul/tur".

Citizen science & Repara/kul/tur project

Current social science methods like interviews and questionnaires are of limited use to study everyday repair activities. This is why this study made use of citizen science research. Citizen science is the practice of public participation and collaboration in science research. Frequently, citizen science approaches have been grounded in collective data collection activities rather than co-designing project aims, methods and analysis. Our aim in the Repara/kul/tur project was to further develop methods for data collection and analysis, collaboratively with the repair and making community that aid the process of making visible daily life experiences and knowledge related to repair and making (for more information about the project see https://reparakultur.org/).

An open call for participating in the research was distributed through several mailing lists of repair and making networks. Additionally, project partners from the repair and making movement, spoke to organisers, visitors and members of several repair and making initiatives to gather possible participants. In total, thirty-two citizen scientists took part in the research at four Repair Cafés and Makerspaces across Germany between March 2018 and December 2019. The sample was diverse in age, socio-economic background, roles taken in the initiatives (incl. frequency and amount of visits), and repair and making skills. The citizen science research was grounded in 1) mixed-method approach that made use of cultural probes (method derived from design research), 2) two participatory research workshops in four repair and making locations, and 3) sixteen follow-up in-depth interviews within citizen scientists.

Cultural probes

Cultural probes are packages of open-ended, creative activities that participants in the research (and in our study citizen scientists) engage with on their own terms and in their own time, including creative tasks (such as maps to complete or cards to fill in, as well as cameras, photo albums and postcards) (Gaver et al. 2004) (see Figure 1). These designed probe tasks reflect an articulation of the researcher's thoughts that are then send to the participants. The participants have to interpret these forms of expression in their own time at home and by undertaking the tasks they express theirs. These interpretations and reflections are finally revealed in the returned probe packs often challenging the researcher's own perceptions. To emphasise this challenge, Joensson et al. (2004:24) have drawn attention to the ''friction' included in the probes that potentially can encourage participants and researchers to view environments, situations and objects in a new light 'with new glasses'.'


Figure 1. Picture of cultural probes.

Cultural probes have opened up new ways of thinking about design-led research methods

that can work alongside, or contest, more reductive science based approaches to research. Sociologists have adapted and reinterpreted cultural probes for a variety of settings and research projects to understand something of people's lives, values and aspirations (Joensson 2004).

In our research, we created probe packs with 16 tasks that were sent to the citizen scientists. The packs have included a mixture of informational and 'inspirational (i.e. fragmented clues) data gathering activities. Our aim was to appropriate the method for citizen science research to encourage the citizen scientists to engage in and record self-observations and reflections about their repair and making practices.

For instance, informational data was gathered through citizen scientists keeping a repair diary, whereas inspirational data was collected through citizen scientists a) writing an obituary for one of their objects and b) representing the social structure of a Repair Café as bike parts (e.g. who takes the role of the handlebar?). Our cultural probes comprised of activities such as taking photos, drawing pictures and maps, or inventing and telling stories. The citizen scientists had three months to engage with the tasks (see Figure 2) before coming together for the participatory research workshop.
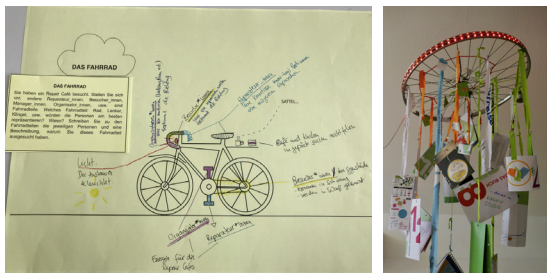
Figure 2. Data gathered by citizen scientists.

Workshops and interviews
Two participatory research workshops were conducted in four locations (in total eight workshops) (see Figure 3). The first workshop was conducted prior to sending out the probes. The aim was to co-develop the probes in the pack with the citizen scientists. The second workshop took part after the data gathering phase i.e. citizen scientists engaging with probes at home. During the second workshop, the data collected by the citizens was collectively analysed as part of 'thematic analysis' groups based on individual probe

comparisons. At the end of the workshop, each group shared their findings.

Figure 3. Participatory reserach workshops with citizen scientists.

Furthermore, in-depth face-to-face-interviews were conducted with sixteen citizen scientists, who wanted to continue with the analysis. The interviews allowed researchers and citizen scientist to delve more deeply into people's own probe pack and deepen the citizen's individual 'repair biography'.

Empirical findings

Dimensions and phases of doing repair in everyday life
This section makes use of repair stories derived from the probe analysis with the citizen scientists to delineate the dimensions and phases of doing repair in everyday life and discuss changes to human object relationships (see Table 1). The repair process can be divided into diagnosing (i.e. establishing that an object is in need of repair and identifying the 'fault'), fixing (i.e. making time to look at the 'fault' and repair the object), and integrating (i.e. integrating objects back into daily routines).

Our analysis has drawn attention to several dimensions of doing repair in everyday life that are implicated in the performance of repair: (a) condition of object in need of repair, (b) socio-material arrangement for repair at home, (c) repair skills and experiences that exist in households, (d) object in need of repair and its role as part of performing everyday life, (e) socio-temporality of practices associated with object in need of repair, and (f) socio-spatial arrangement of object in everyday life (see Table 1 for an overview and examples).

Diagnosing (pre-diagnosing)
Repair activities often start way before people make their way to a toolbox. There are several daily activities in which we order (e.g. clothing in cupboard), clean (e.g. surfaces on coffee machine), and use (e.g. cycle to work) objects. They provide moments in which we 'pre-diagnose' the conditions and functions of an object. The hole in the jeans has become too

big to wear it, the broken handle of the frying pan makes cooking with it difficult, or the tap in the garden has started to leak. These are only a few descriptions from the fieldwork but they start to illustrate the *temporal and spatial dimensions* of repair. Some of our objects get 'pre-diagnosed' more regularly then others. For instance, jeans get worn, washed, hung up, and order back into the cupboard. They are rotated through our homes and are regularly inspected. Other objects, such as, garden taps that have a more 'seasonal' use get diagnosed far less often. Some of these 'seasonal' objects are so well stored away (such as tents) that we hardly ever come to 'pre-diagnose' them and can even forget that we own them.

Moreover, what becomes apparent is that phases of pre-diagnosing, diagnosing and fixing are somehow fluid and have diverse *temporal patterns*. Jeans can be worn until holes becomes too big and taps can leak worse and worse until we get bothered enough to do something about it. Scanner/printers are just used for scanning if they no longer allow us to print something. People try to find ways to lengthen the time between diagnosing and fixing.

Our citizen scientists found that people have innovative ways to lengthen this time. Objects do not only break and then no longer can be used. There are *different types of object* in our homes that have varied ways to lengthening the diagnosing time: assemblages of similar things (e.g. CDs, t-shirts, cables) where a broken item can be easily replaced. Memory objects (e.g. Julie's desk) where 'faults' such as scratches and breakages are accepted because they become part of the memory.

Moreover, looking at the *socio-spatial arrangements of objects in daily life*, it became apparent that objects in need of repair do not only derive from people's homes. In particular, some of the 'serious' amateur repairers regularly pre-diagnose objects left on the street and auctioned on the internet. One example is Mike (all names anonymized), who regularly auctions objects in need of repair for a small price in order to fix them. He now has collections of computer parts and power tools that have been waiting to be repaired. Similar, Adrian has recently found a broken ladder on the street. He fell in love with it; it looked somehow 'Italian' for him.

Dimensions of doing repair in everyday life	
Condition of object in need of repair	*Can no longer be used *Some functions still work *Can be used in different ways
Socio-material arrangements for repair at home	*A few basic tools in kitchen cupboard *A toolbox with basic tools and a bit more *Several toolboxes and specialised tools *Dedicated repair space (e.g. garage) with specialised tools storage and tools & collection of spare parts *Dedicated repair space that is highly ordered
Repair skills, experiences and competences in household	*Strong socialisation through role figure from early age *Interest in opening object up from early age *Formal training and job experience *Multiple training experiences *Long lived hobby, self-learning, and tinkering *Middle and low socialisation through family members
Object in need of repair as part of performing everyday life	*Invisible workhorses *Visible workhorses *Daily tools *Home making objects *Collections *Memory objects *Assemblages & containers *Overflow objects *Morally worn out objects
Socio-temporality of practices associated with object in need of repair	Regular or non-regular use; e.g. *Seasonal practices with seasonal objects (like ice-cream-maker) *Special occasion practices (like fondue set) *Regularly performed practices
Socio-spatial arrangement of object in everyday life	*Hidden spaces e.g. garages, cellars, second ceiling, spaces at the back of the cupboard, top draws and cupboards *Waiting spaces e.g. cupboard, baskets *Rotation spaces e.g. laundry basket, dishwasher *Routine spaces: kitchen cupboards, shoe rack *Display spaces: mantelpiece *Spaces outside the home

Table 1. Dimensions relevant for doing repair in everyday life (the Table represents the repair trajectories that emerged in our fieldwork (other ones might also exist).

Diagnosing
Once pre-diagnosing has occurred, diagnosing the object in need of repair can begin. Sometimes diagnosing is pretty straightforward, the 'fault' makes itself visible. For instance, the handle from the frying pan comes off, the steps on the ladder are partly broken, or plant pot has shattered into pieces. Other times, diagnosing

can take time and even starts to overlap with fixing. For example, the hobs on the electric oven can no longer be turned on. Mike had to slowly and carefully open up the oven in his cohousing project, keeping track of how the different parts fit together and in which order. Some citizen scientists make pictures of each diagnosing/ fixing step to make sure they can put the object back together after fixing it. Additionally, Mike had to make sense of the electric circuit: how are the different parts connected and how does the electricity flow through the object. Different tools that can measure the electric current helped him along the way. In the end, he had to draw a detailed electric circuit to explain to himself where the 'fault' might be uncovered.

Mike's example also makes visible the *socio-material arrangements for repair in people's homes* and their *repair skills and experiences.* These differed greatly between the citizen scientists. Repairers, like Mike, have dedicated, specialized tools to conduct the diagnosis (e.g. electronic measuring instruments). Such specialized tools are sometimes even needed to open up objects such as 'pentalobe' designed screws used in smart phones that can only be unscrewed with particular screwdrivers. Space also seems relevant to be able to take objects apart so that the 'fault' can be detected and the parts can be left sometimes for days. A small number of citizen scientists had dedicated repair spaces where they had all of their tools, lighting, etc. A handful of these repairers had developed dedicated storage spaces for their tools, spare parts, and other useful materials. More common was that the citizen scientists had one tool box at home and often used the kitchen table to conduct necessary repairs.

For some of the citizen scientists, examining and diagnosing objects started from an early age. 'You are so destructive. You always destroy things that I have bought', this is what Oscar's mother used to regularly say to him when he was curious about how the radio looked like from the inside. The neighbor, who was a keen tinkerer, recognized Oscar's interest and allowed him to observe and encouraged his own experimentations. Over time, repair, making and tinkering has become a way of life for Oscar. He sometimes gets paid for it and other time he does not. Quite a few of the other 'serious' amateur repairers went through some formal training, for instance, studying engineering, where they learnt different processes to diagnose objects' 'faults'.

Thus, early engagements with parents, siblings, friends and neighbors or formal and informal educational settings socialized an interest in repair or a certain fearlessness to start repairing i.e. open broken objects. This makes it easier to proceed from diagnosing to fixing.

Fixing
Collaboratively analyzing the probes during the participatory research workshops, it quickly became apparent that fixing objects sometimes (and regularly) becomes an integral part of our daily live. We regularly conduct 'routine' fixes (such as sewing ripped trousers, gluing the soles of a shoe, and repairing a bike puncture). Glue and tape is used quite frequently. Although people fix objects, they do not necessarily consider these as repairs.

Other 'routine' fixes can consist of exchanging parts that are broken or missing, for instance, replacing a broken washer from the water sprinkler or exchanging a broken light bulb. These fixes depend on people getting or having the necessary spare part. They can take days because people might need to buy the part but often require little time, effort and knowledge. 'Serious' amateur repairers have a slight advantage. They often have collections of spare parts at home and do not have the additional trip to the shop before fixing the object. Moreover, they usually know what type of part (e.g. screw) needs to be the replacement/ bought.

The object's role in the performance of daily practices regularly plays a key role. As seen above, people often try to lengthen the time between diagnosing and fixing. Quick, 'half' fixes often are an option, for instance, using safety pins for holes in clothes. It seems that we live with quite a few 'half fixes' and 'half working objects' around us to sustain the performance of daily practices e.g. wearing clothes. Until the point is reached or there is a bit of spare time to fix the object or even have it fixed.

'Serious' fixes often take longer and can even become long term projects e.g. the diagnosis might take a long time, specialized tools can be needed to diagnose the broken item, spare parts need to be bought. Sometimes, citizen scientists have had to consult the internet or professional sales or repair people along the fixing process. For example, Julie took her broken tablet back to the shop and asked whether she could get a replacement charger for it. The salesperson told her that they no

longer sell them and that she would need to get a new tablet. Julie did not want to give up, went home and consulted the internet. Within an internet forum, she could read that there still is a charger, which works for her type of tablet. She ordered it and the charger arrived in a few days. Testing the charger, Julie realized that it was not only the charger that was no longer working but also the battery was damaged. The battery could no longer be fully recharged. This time, Julie went straight to the internet and found a video where someone described how to replace the battery of her tablet. After watching the video, Julie felt that she wanted to give it a go. She ordered a battery. Once it arrived, Julie prepared her kitchen table, got out her mobile phone to be able to take a photo of each step. Julie fixed the tablet.

The tablet is a good companion for Julie in her daily life. She likes to quickly look things up on the internet. Further, she is able to take it with her during her travels, booking her accommodation whilst travelling from one place to the next. The tablet seems to be a 'workhorse' (see Cox et al. 2013 work) for her i.e. in regular use and always on standby. These objects when broken create a vacuum that soon needs to be filled to be able to perform 'normal' daily live. Additionally, Julie had the self-trust, knowledge of repair procedures and willingness to ask for advice, consulting different sources to successfully fix her tablet (see dimension *repair skills*).

Integrating (or not)

After the fixing phase, objects can potentially be integrated into the daily performances of practices (such as a fixed bike puncture allows the person to cycle to work again). It becomes again an integral part to these performances and keeping practices alive. Such integrations are not necessarily a given. Quite often in Repair Cafés, people have their objects fixed and rather than taking them back home, offer them for free to the organizers. 'I have already bought a replacement'. Here, the need of the object to perform daily routines might be key (*socio-temporal arrangement* of everyday life). Rather than having the hoover fixed, people sometimes buy new ones to continue their weekly hovering routines. Buying a new object shortens the diagnosing to fixing period (because the need to fix the item is no longer needed).

As seen above, some objects in need of repair are newcomers to someone's home (see Adrian's ladder). Once the object is fixed, new practices need to be developed so that the object can be integrated into people's daily lives. In Adrian's case, the ladder (even after fixing it) was too dangerous to be used by others. It still lives with him but he will soon move out and might pass the ladder to someone else. Mike lives in a co-housing project in which repaired object can more easily find a new owner. Adrian's example also demonstrates that some objects do not really fully get repaired. Some functions might be recovered but not all.

The fixing process does also not always end well. The object does not work or is even more 'broke'. This does not necessarily mean that the citizen scientists get rid of them. They are often stored away, waiting to be thrown away or fixed. Dedicated repair and storage spaces in people's home usually encourage such practices of keeping objects in need of repair. One of the organizers of a Repair Café explained that often, people would not necessarily be unhappy if their object could not be fixed in the Café. People were glad to know that an 'expert' tried to fix it but also failed. The object was truly 'broken' and could therefore be thrown away with a good conscious.

Conclusions

This paper presents first insights from our citizen science research, investigating the dimensions of repair in everyday life and changes to human object relationships: How is repair performed in everyday life and how does the human-object relationships change through repair? Repair activities often follow particular phases, starting with the (possibly very long) phase of pre-diagnosing/ diagnosing the object in need of repair, followed by the fixing process that is not always straightforward, and finally, if fixing was more or less successful, the re-integration of the object in everyday life. These phases are not necessarily performed in a linear and/ or chronological way.

So far, our results have revealed several relevant dimensions for performing repair in everyday life: 1) condition of object in need of repair, 2) socio-material arrangements for repair in people's homes, 3) repair skills, experiences and competences in the household, 4) object in need of repair as part of performing everyday life, 5) socio-temporality of practices associated with object in need of repair, and 6) socio-spatial arrangement of object in everyday life. Such dimensions might

be of interests to scholars working on repair for several reasons.

First, pre-diagnosing can occur daily and way before any kind of fixing is taking place. During this phase, socio-spatial arrangement of objects and socio-temporality of practices associated with the object seem to play a key role for whether repair is performed (or not). Depending on how often people perform daily practices with an object (such as brushing teeth with an electric toothbrush), they have the possibility to scrutinize its current condition and value i.e. pre-diagnosing it. Objects do not only help people to perform daily practices, they also demand 'caring' practices to be performed for them: cleaning, storing, etc. Such practices can often lead to quick fixing activities (such as sewing on a button). One preliminary finding is that people seem to fix quite a few objects in their daily life. These might not be 'serious' fixes but they still require time, resources and care.

Second, fixing an object in need of repair often also relies on how they are integrated in the performance of daily practices. If an 'invisible workhorse' (e.g. washing machine) breaks, the need to repair the items in order to keep routines up might be so great that rather a new object is bought to replace the broken one. Other objects (such as bikes) are usually repaired within a few days. Quick or half fixes often become an option. Other objects (such as memory objects or collections) can usually stay longer in a 'waiting to be fixed' phase, considering that the 'deterioration' is part of keeping up the memory. Such temporal rhythms are therefore key when thinking about the relations between objects and repair activities.

Third, the research also shows that early socialization processes that help to gather repair experiences play an important role for repairing in later life. Besides practical repair know-how that people might gain through early experiences, they are able to build a sense of self-efficacy and courage towards opening up objects where regular repair can become the norm throughout people's life.

As part of our future research into repair in everyday life, we will deepen these first insights and develop an understanding of the interlinkages between repair in community-based workshops and people's home. So far, our conceptual approach that puts emphasis on materiality and bodily performances proved to be appropriate to study repair as a practice.

Although our chosen methods have not been the focus of this paper, we would like to point out that the citizen science approach enabled the team to investigate the research topic in unexpected ways. Moreover, it sometimes created tensions on how to conduct the analytical work in a rigorous way i.e. according to existing social science standards. After some initial irritations with the methodology – likewise for the academics and citizen scientists – the probes facilitated a fruitful stimulus for self-reflections and proved to be a well-working visual and textual trigger for analytical discussions in our research workshops.

Acknowledgments

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