

Dimensions of sustainable behaviour in a circular economy context

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Abstract

Although Design for Sustainable Behaviour research has seen increasing attention over the last decade, limited attention has been directed towards behaviours relevant for a circular economy. To investigate this shortcoming, this paper collected empirical examples that reflect where these two research fields meet. The result of this analysis is presented as a grid consisting of nine dimensions of behaviour change (control, obtrusiveness, timing, exposure, meaning, importance, direction, encouragement and empathy) and four goals for circular economy (maintenance, reuse, refurbishment and recycling). The collection of behaviour change principles shows that examples for almost all combinations exist, with least being identified for refurbishment and most for recycling. This insight does not only give an indication on where attention has been directed previously, but also suggests areas where there may be a need for further development of behaviour principles. The overview of examples of behaviour changing principles related to circular economy may also foster inspiration among practitioners both within Design for Sustainable Behaviour and circular economy.

Introduction

The rapidly developing field of Design for Sustainable Behaviour (DfSB) is an example of a transdisciplinary enquiry and aims to investigate, at various levels, how to influence the sustainability impact of consumers' activities. This is done by studying their behaviours and practices, developed over time and in space. A couple of dozen case studies have been reported on so far in the literature (Daae and Boks, 2015), and almost without exception these focus on interaction with (new) products, such as choice of preferred washing machine programs (McCalley and Midden, 2002), switching off electrical appliances (Rodriguez and Boks, 2005), socially sustainable mobile phone use (Lilley, 2007), behaviour related to leaving the door of a refrigerator open too long (Elias, 2011), and sustainable use of wood stoves (Daae and Boks, 2016). These studies used a variety of user-centered research methods, such as diaries, interviews, surveys and video observation, and generally conclude with suggestions for product-oriented design interventions. DfSB literature has proposed a number of behavioural dimensions (Daae and Boks, 2014), strategies for design intervention (e.g. Lilley, 2009, Scott et al., 2012), and inspiration tools (Lockton et al., 2010, Daae and Boks, 2017) that may assist designers in finding solutions towards sustainable behaviour.

Behavioural challenges related to circular economy typically include maintenance, refurbishment, reuse and recycling behaviour (Ellen MacArthur Foundation, 2012, van Weelden et al, 2015, Piscicelli and Ludden, 2016), but may also include other behaviours such as purchase or sharing behaviour (Tukker, 2013, Ellen MacArthur Foundation, 2012). According to our observations, there has not yet been much attention in DfSB literature for applying tools and methods to behavioural challenges specifically related to fostering a circular economy. Most case studies in the DfSB literature (many of which are mentioned in Daae and Boks (2015)) address behaviour related to energy, water, food or product efficiency, or in other words, to 'using less'. The card deck tool "Design with Intent" presents 101 strategies for how designers may be able to influence behaviour using different 'lenses', each accompanied by an example. Only one of the examples (a waste bin) presents an example that can be directly related to a circular theme.

There may be several reasons for this lack of attention. These types of behaviour may be seen as principally a yes or no decision (i.e. there are no increments as there are with using less), and therefore less interesting from an academic perspective. DfSB researchers may also avoid purchase or disposal behaviour because they have a preference for

focusing on the interaction between the user and the use phase – which covers the core functionality of the product, and usually its main environmental impact. Themes related to design for a circular economy, such as design for reparability, upgradability, disassembly, remanufacturing, recycling etc. have been researched extensively in more traditional Design for Sustainability literature, but these fields have typically had a limited focus on the use phase (Boks & McAloone, 2009), and even less on user behaviour. There is also a lack of consensus on the exact meaning and differentiation of these circular economy terms, with for instance refurbishment commonly being confused with remanufacturing, and recycling used as a ‘catch-all’ description that may imply reuse, repair, up and down-cycling and other activities, depending on the context.

Research questions and methodology

The above considerations provide the context for this paper, as they made us wonder to what extent DfSB principles are used in a circular economy context. One of our goals is to do a preliminary investigation on how insight from DfSB research may contribute to improved design for circular economy. We make this concrete by addressing the following research questions:

- Can we, in contradiction to our findings from reviewing DfSB literature, find good examples of design strategies that have addressed behavioural components related to circular economy challenges?
- Does a search for such examples provide us with insights on how often DfSB strategies are applied in certain contexts, and which strategies may be more or less useful to apply?
- Can we, based on these findings, draw conclusions, formulate hypotheses, and/or recommend further work related to the potential of addressing circular economy challenges with DfSB approaches?

In order to address these questions, we refer to the Dimensions of Behaviour Change. These consist of 9 main dimension categories (and 55 sub-dimensions) identified in Daae and Boks (2014). Here, the following dimensions were proposed as distinct categories of how designers may influence behaviour: Control, Obtrusiveness, Encouragement, Meaning, Direction, Empathy, Importance, Timing and Exposure. These dimensions were the result of extensive workshops with both design professionals and students in Norway and the Netherlands, and are an operationalization of elements in the CADM (Comprehensive Action Determination Model) (Klöckner and Blöbaum, 2010), which contributed to the theoretical foundation of the Dimensions of Behaviour Change. The model explains how behaviour is a result of automaticity (what habits the user has), norms and values (what the user thinks is right or wrong), intentional processes (what the user wants), subjectivity (what the user thinks he or she can or cannot do), social factors (how others influence the user) and situational contexts (how surroundings influence the user). Table 1 further explains the dimensions.

Results and analysis

To structure our discussion of the four circular economy goals (maintenance/repair, reuse, refurbishment and recycling) in the context of the nine Dimensions of Behaviour Change, we first created a grid in which we placed examples of behavioural principles for each of them (see Figure 1). We acknowledge that to some extent, this was a random process, but we saw no other way to collect data that would represent a more systematic coverage of examples that may exist. We have attempted to reduce the randomness by having three researchers explore their surroundings and the internet, each of them using their own approach and knowledge of ‘circular’ products and services. Open areas of the grid do not imply that there are no examples to fill these gaps, but merely that we did not find them in our investigations. This suggests that these areas probably represent less common applications of behavioural principles in a circular economy context.

Control	How much control the user has over the behaviour can vary from complete control to no control. If the user has much control, designers can only expect the user to behave the desired way if this is in line with their intentions. Having more control is often easier to accept for users, but will generally require more attention, and willingness to pay that amount of attention.
Obtrusiveness	How obtrusive a design is will affect how likely it is that the user will become aware of it, but it will also affect how likely it is that the user accepts it. Sometimes the immediate attention of the user is required, whereas in other contexts the user must not be disturbed.
Encouragement	When attempting to making people change their behaviour, designers can focus on which behaviour to avoid, or rather on which way to behave, or perhaps present alternative ways of behaving – all with various degrees of encouragement.
Meaning	Sometimes people behave a certain way because they think it is the right way to behave, or because they are afraid of the consequences of behaving differently. Sometimes people might do something just because it is enjoyable or fun, or emotional in some other way.
Direction	The more the user will agree with the way the designer tries to make him or her behave, the more likely it is that they are willing to make an effort or even sacrifice to behave that way.
Empathy	Whether people focus on themselves or on others and what others might think of them depends both on who they are, what they think is important, and on the situation they are in.
Importance	How important someone considers certain behaviour, or the consequences thereof, to be, will affect how much effort the user is willing to put into it. It will also affect to what extent they will accept design solutions that take away the possibility to control their own behaviour.
Timing	Whether users encounter behaviour principles before, during or after the behaviour will affect how they are affected by them. Sometimes the context or the users disqualify some options because the users are unwilling to pay attention, or because the context does not allow them to be interrupted.
Exposure	Users have different needs, and exhibit different levels of acceptance, depending on how often they interact with a product. Something might work if the user encounters it rarely, but lose its effect or become annoying if the user encounters it every day.

Table 1. Dimensions of Behaviour Change.

Maintenance and repair strategies

Finding examples related to maintenance and repair is fairly easy. The Fairphone enables the user to replace broken parts on the phone and thus prolong the lifespan of the phone itself, which is an example of a control strategy. Car dashboards indicate with an obtrusive warning when a car is due for a maintenance overhaul. The Norrøna flagship store in Oslo has a service centre, where you can get your clothes fixed if you were looking for new, creating perfect timing. In many convenient locations (such as train stations), we are still exposed to shops that repair our old shoes. Patek Philippe Watches market their products with the slogan “You never actually own a Patek Philippe. You merely look after it for the next generation”, providing meaning. Public advertisements point out the importance of repairing your products. Shops fixing broken glass on cell phones provide a service in the same direction as the user probably wants. On the web, there are multiple videos of how to fix things, providing encouragement to users. The Restart project organises social gatherings where you meet others and help each other repair electronics and household items. This can be regarded as an empathy strategy.

Reuse strategies

Similarly, it was relatively easy to find examples of design focused on people’s participation in reuse. Filippa K has second hand clothing stores in some of their shops, giving users control by enabling them to buy used clothes. Royal Dutch Shell give users the option to use their own favourite cups instead of giving away new cups when they enter a coffee subscription, timing it with the moment when they subscribe. Second hand clothes stores have collection points spread out in many cities, exposing people to the concept of giving away the clothes they do not need. Finn.no, a major Norwegian online second hand store, published an estimate they had done of the reduced global warming impact their business had resulted in, giving meaning to it. Off-brand printer ink retailers often reuse original empty cartridges when they sell their products, providing a product in the direction people want. In some trains, there is a collection point where people are encouraged to leave newspapers for reuse. There are multiple apps and communities enabling members to help and share things and services, appealing to people’s empathy.

Refurbishment strategies

Refurbishment strategies that make use of the various dimensions of behaviour change were less easy to find. We also noted a thin line between refurbishment and reuse.

A Swedish ketchup producer gives away sports caps that enable the user to repurpose empty ketchup bottles as water bottles. We would characterise this as a control strategy. Patagonia offers to refurbish worn Patagonia garments and marks them with a label, advertising for the concept in an un-obtrusive way. Freitag informs customers that the material in their product comes from truck-covers and thus gives meaning to them. “Sofa gutta” refurbishes old high-quality couches and resells them. This is in line with many people’s demand and thus categorized as direction. Urban Upholstery refurbishes old furniture, leaving the frame exposed in order to encourage future refurbishment. In Japan, it is considered culturally valuable to repair something that is broken. People even use valuable materials such as gold in repairs and make them obvious; an example of using empathy.

Recycling strategies

We found it easiest to identify examples of use of behaviour change strategies in the context of recycling strategies, with all dimensions represented. This was not surprising as recycling behaviour has received a lot of attention in the behaviour literature (e.g. Thomas & Sharp, 2013; Klöckner & Oppedal, 2011; Schultz, Oskamp, & Mainieri, 1995).

Information on milk cartons that they can be recycled with plastic caps makes it easier for the users and provides them with control over their actions. Max, a Swedish burger chain has so many recycling fractions in their restaurant that it promotes recycling in an obtrusive way for the consumers. Firms such as HP provide return packaging for used toner cartridges upon purchase of new



Figure 1. Grid of DFS strategies related to CE.

ones, an example of good timing. People are increasingly confronted with waste bins that provide the option for separating paper, bottles and general waste, which makes it more likely that they will participate in recycling behaviours. Municipalities that systematically offer such waste bins could be said to apply an exposure strategy. The Fun Theory concept of “bottle bank arcade” makes it fun to recycle and is thus a meaning strategy. Garbage trucks in Oslo have “value transport” printed on them to remind people of the importance of recycling. Many cell-phone companies offer trade-in options of old cell phones. As this is in line with many customers’ wishes (to have a new phone and a discount), it is a direction strategy. Information about what recycling fraction it encourages people to recycle packaging. Keep America Beautiful ensures that recyclable bottles address users in the first person, with the words “I want to be a bench. Recycle me”, an example of an empathy strategy.

Conclusions

Space restrictions for this paper do not allow us to discuss more examples or go into detail about the way knowledge from behavioural psychology is applied in practice. We do see that the majority of behaviour change dimensions can be found in ‘real life’ examples for most of the four circular economy goals, and in some instances, these examples could fulfil two or more of the dimensions (e.g. timing and exposure for the repair shops). However, we found it more difficult to find examples for refurbishment strategies, which may be because refurbishment is not a widespread offering in business-to-consumer markets (Mugge et al, 2017). Moreover, it is worth noting that the behaviours actually required of consumers are often not ‘refurbishment’ or ‘recycling’ exactly (these processes normally are done by companies), but more ‘return’, ‘sort’ or ‘separate’, and therefore in a future study it may be necessary to adapt the circular economy goals accordingly. The circular model of leasing or sharing as a replacement for ownership is another goal for future exploration, and a focus on the growing Product Service Systems (PSS) and access-based consumption (e.g. Bardhi and Eckhardt, 2012) literature would provide a basis for this.

Given more space, it would be advantageous to examine a few of the examples referred to here in greater detail, focusing more closely on the language and means of communication with consumers, and the values and intentions of the companies. There is also scope to develop the table in Figure 1 into a tool for practitioners to use in designing new communications for circular economy behaviours.

Many of the examples found may not be the result of extensive research on how users can best be influenced, but rather happenstance or the result of ideas to solve immediate problems. An adaptation of DfSB methods to the circular economy context may prove advantageous to the efficiency and adaptation of circular economy efforts. This may be especially relevant for more tricky or large scale circular economy value propositions that are further

away from the user’s daily life, such as buying reused clothes or electronics.

The overview created by this study will hopefully inspire practitioners to apply behavioural principles in the context of circular economy and may contribute to increased attention to the large opportunities formed by the meeting point of the two fields.

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