WHEN TO APPLY DIFFERENT DESIGN FOR SUSTAINABLE BEHAVIOUR STRATEGIES?

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Abstract

Increased focus in research on the environmental consequences of behaviour and product usage the last decade has resulted in a number of different design strategies. The strategies are meant to stimulate desired behavioural patterns or to avoid undesired ones. Although this provides understanding of how behaviour may be changed, there has been limited discussion about when and in which context to apply the different strategies. This paper aims to investigate when different strategies are likely to have the intended effect, depending on how they divide the control between the user and the product. Factors affecting behaviour, identified by social psychology, are used as a framework for this investigation. The result is a number of guidelines that are meant to help designers make informed decisions about which behaviour changing strategies to apply.

Keywords
Sustainability, Behaviour, Design, Social Psychology

1. Introduction

In recent research there is consensus about the large potential for achieving environmental benefits from altering users' behaviour and the way they interact with products (Jelsma and Knot, 2002, Jackson, 2005, Rodriguez and Boks, 2005, Lilley et al., 2005, Elias et al., 2007). Some authors have proposed strategies for affecting user behaviour, sometimes accompanied by case studies (Lilley et al., 2005, Jelsma, 2006, Bhamra et al., 2008, Elias,

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2009, Lilley, 2009, Lockton et al., 2010). This research has shown the potential of design for sustainable behaviour and identified promising design strategies, but there has been limited discussion in literature about when and in which context the different strategies are most likely to be effective. The need for this was identified by Pettersen and Boks in 2008 (Pettersen and Boks, 2008b).

One of the papers that takes a step in the direction of such a discussion was published in 2008, by Bhamra, Lilley and Tang. Here, to two theories from social psychology are presented, Triandis' theory of interpersonal behaviour and John Anderson's theory of development of cognitive skills (Bhamra et al., 2008). The theories are used to identify when different design interventions should be applied in order to create new habits (see figure 1). The main structure is based on Anderson's theory, which identifies three stages in development of cognitive skills. Firstly, the Declarative stage, in which facts about the skill domain are interpreted. Then the Knowledge compilation stage, when knowledge is converted into a procedural form and can be directly applied without further interpretation. And finally the Procedural stage, where the knowledge can be applied more appropriately and the process can be speeded up (Anderson, 1982).
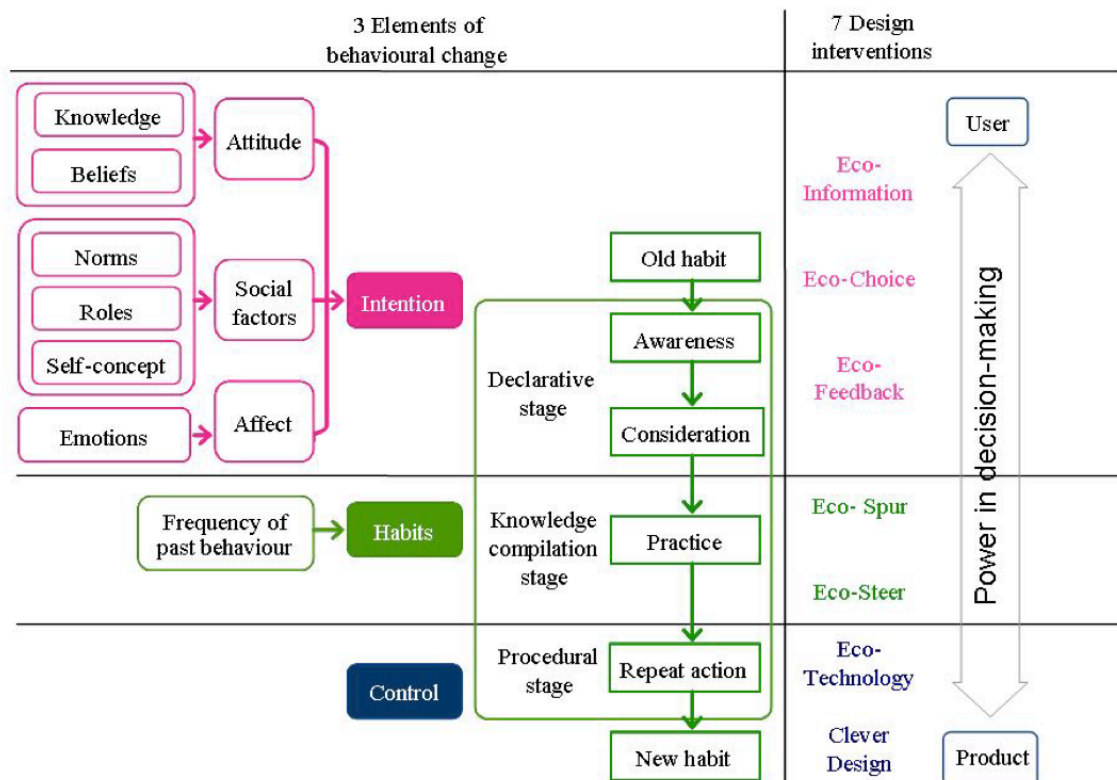

Figure 1 (Bhamra et al. 2008)

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This approach of comparing the behavioural theory, not only with the stages in formation of cognitive skills, but also with design strategies according to their division of control, points out the potential of combining these types of research. It also suggests some aspects that need further investigation.

The focus of the research by Bhamra et al. seems to be on the transformation of habits. This is an important topic, but as Triandis' theory and several other theories in social psychology point out, habits are only one of several factors affecting behaviour. "Environmentally relevant behaviour lies at the end of a long causal chain involving a variety of personal and contextual factors" (Stern, 2000a). Bhamra et al.'s model does make a connection between design strategies and Triandis' theory, but this is not elaborated or discussed in the paper. The reasons for the indicated connections are based on "the understanding of the behaviour disintegration and formation and relationship between antecedents of change in behaviour/habit and different levels of design intervention" (Bhamra et al., 2008).

A thorough investigation of what the different factors that affect behaviour can tell us about the potential usefulness of design strategies, is likely to be helpful in making informed decisions about which strategies to apply. In order to conduct such an investigation, there are a few topics that need to be addressed. These include 1) a structuring of design strategies proposed in literature, enabling comparison and discussion about their applicability, and 2) a framework for understanding the factors that are affecting behaviour. Inspired by Bhamra et al.'s introduction of social psychology models for this purpose, a model for identification and structuring these factors is proposed in this paper. Finally, these two sources of insight are brought together, to explore how they can be of help in making informed decisions about when different strategies for designing sustainable behaviour are likely to be effective.

2. Structuring the design strategies

The last decade, there has been an increasing focus in product design research on how the design of products can influence and alter the behaviour of users and thereby reduce the negative environmental impact of activities associated with this behaviour. Among the results of this research, a number of strategies for how behaviour can be altered have been identified. Even though many of the strategies appear similar, there are differences in the way they are presented. An investigation and recommendation of when different strategies are most likely to be effective, requires a structured comparison of the strategies.

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In 1997, Jelsma connected Akrich' (1992) concept of 'script' to the goal of reducing environmental impact through the way people interact with products. He described a script as a means of altering the way people use products and thereby limiting the environmental impact. The idea behind the script is "a kind of user manual inscribed into an artefact" where the design of the product guides the way it is being used (Jelsma, 1997). In 2006, Jelsma elaborates this further by describing four different properties of the script. They are: force (how strongly the script prescribes the behaviour), scale (the level of complexity), direction (in which direction the behaviour is being steered), and distribution (how much responsibility and power the user is given) (Jelsma, 2006).

The dimension of distribution is the property used by Lilley, Lofthouse and Bhamra in the proposed extension of this structure of strategies in 2005 (Lilley et al., 2005). In this structure the concept of scripts covers the middle of a spectrum, but at the respective ends of this spectrum Eco-feedback and 'intelligent' Products and Systems are added. Whereas scripts persuade or guide the use of the product through the way it is designed, the idea behind Eco-feedback is to influence the behaviour through providing information or feedback. The latter category, 'intelligent' products and systems, takes control of the behaviour away from the user and forces desired behaviour or blocks inappropriate behaviour. According to Jelsma and Knot, the concept of scripts "can be more or less compelling, but it will never totally determine user actions" (Jelsma and Knot, 2002). In the comparison with Anderson's and Triandis' theories, Bhamra et al. (2008) elaborate the distribution even further by splitting it up into seven parts.

A similar structure was presented in 2007 by Elias, Dekoninck and Culley, consisting of Consumer education, Feedback and User Centred Eco-Design. The user centred eco-design is defined as "creating products where the most intuitive and comfortable way of using and interacting with a product or system is also the most environmentally friendly" (Elias et al., 2007).

This research points out that the structuring of design strategies based on the distribution of control between the user and the product is widely used, as already recognized by Pettersen and Boks (2008a). Because the structuring also has a foundation in the way the user interacts with the product, and the amount of attention and reasoning demanded by the user, it seems like a promising framework to compare with knowledge about reasons for behaviour.

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In this paper, the distribution of control will be treated is as a scale where the user has complete control on one end, and the product has complete control on the other. In the end where the user is in control, the design strategies focus on providing the user with information or feedback. This input will in most cases have to be registered, interpreted, understood and reasoned upon before a behaviour change can be expected. On the other end of the scale are design strategies that either force the user to behave in a certain way or eliminate the users behaviour by acting automatic. As the user does not have any influence, these strategies will, in principle, require limited or no attention from the user to change the behaviour. The variation in cognitive load different strategies may require from the user, was also recognized by Lockton et al. (2010). Between the two extremities are strategies with a varying degree of division of control. Solutions can range from simply enabling a certain type of behaviour, to guide or steer the behaviour in the intended direction. In figure 2, a number of words are suggested in an attempt to clarify the distribution.

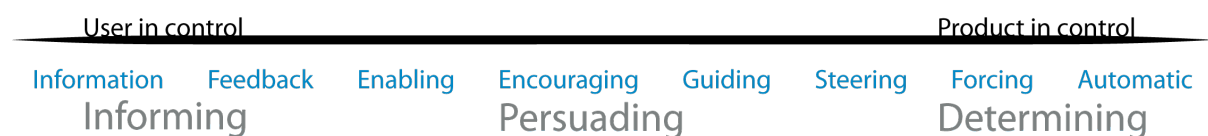| User in control						Product in control	
Information	Feedback	Enabling	Encouraging	Guiding	Steering	Forcing	Automatic
Informing			Persuading			Determining	

Figure 2, Distribution of control

Other properties of design strategies for behavioural change may exist that can be used to compare or structure them. Jelsma described the script concept with three additional dimensions and Lockton, Harrison and Stanton have developed a framework based on the function of the strategies (Lockton et al., 2010). Inclusion of these dimensions could contribute with further insight or other results than just the division of power. However, in this research project it is focused on the dimension of distribution, as this is the most commonly used. The other dimensions should be investigated in future research.

3. Social psychology models

Psychology is a discipline that has done a great effort to identify the factors affecting human behaviour. "Understanding, explaining and changing human behaviour are the main objectives of psychology in general" (Klöckner and Blöbaum, 2010). Studies of the relation between attitude and behaviour have been published as early as the 1930s (Ajzen and Fishbein, 1977). Throughout the years, numerous theories and models have been

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developed and presented, contributing to unravel the complexity of behaviour determination and prediction, and identifying multiple factors affecting behaviour.

In 2005, Tim Jackson presented a review of models describing behaviour and behaviour change. He points out that many of the models are missing key causal influences, often by focusing either on internal (attitudes, values, habits and personal norms) or external aspects of behaviour (incentives, institutional constraints and social norms). This makes them less suitable as heuristics for exploring specific behaviour or for identifying the factors that may influence the behaviour. There are some models that attempt to include all the possible variables that might affect behaviour. However, these models tend to be too complex, making it difficult to test them empirically to obtain quantitative evidence of behaviour (Jackson, 2005). Triandis' theory, applied by Bhamra et al., is one of the most promising models according to Jackson's evaluation. However, he points out that it is not as commonly used as several other theories, probably due to its complexity or lack of parsimony. This indicates that it could be relevant to search for an alternative model.

In 2010, Christian Klöckner and Anke Blöbaum presented a first version of a Comprehensive Action Determination Model (CADM – see figure 3). This model is based on four theories that have been acknowledged for their strength of explaining behaviour, but also criticized for not integrating all the factors that may influence the behaviour. The theories are the Theory of Planned Behaviour (TPB), the Norm-Activation Model (NAM), the theoretical concept of habit and the Ipsative Theory of Behaviour. By combining the theories, Klöckner and Blöbaum aim at removing the limitations and creating a model encompassing both the internal and external factors. They tested the CADM model in an empirical study together with TPB and NAM, and a combination of the two, which had been introduced earlier in an attempt to explain more factors. The conclusion was that the CADM explained the variation significantly higher than the other models (Klöckner and Blöbaum, 2010). This indication of validity, together with the fact that it includes both internal and external factors makes it an interesting alternative to Triandis' theory.
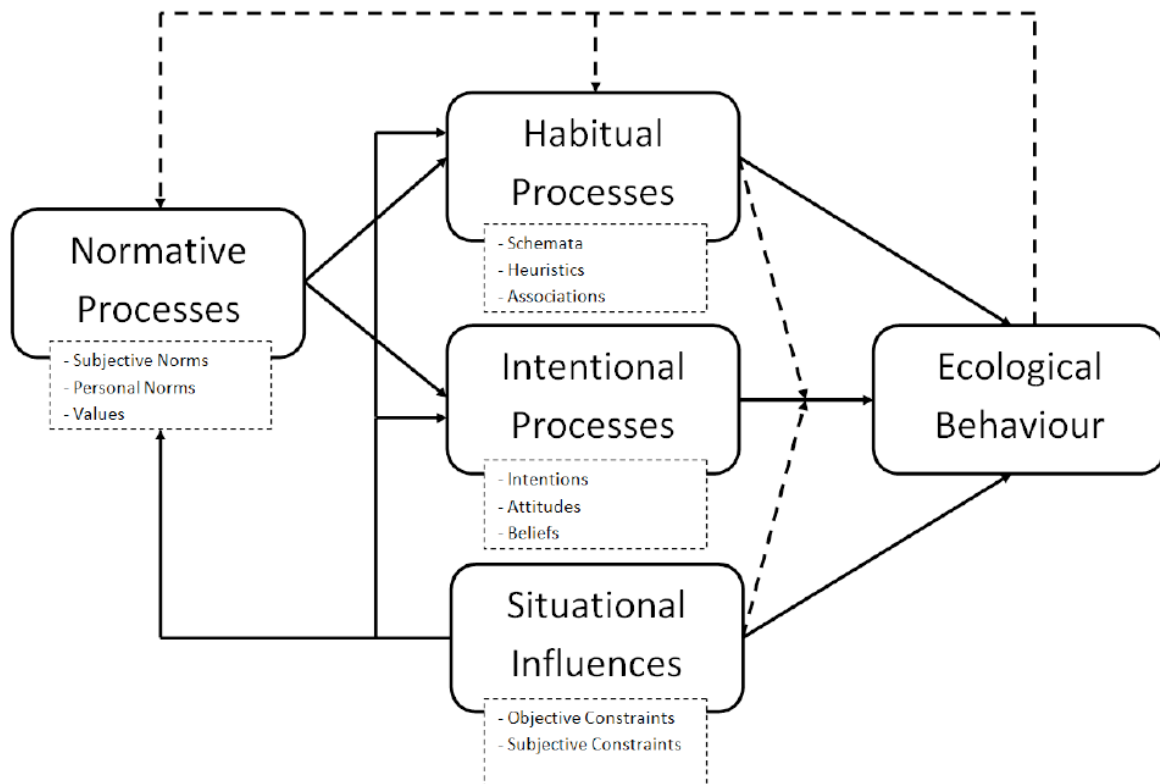
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Figure 3, The CADM (Klöckner and Blöbaum, 2010)

The CADM explains that individual, sustainable behaviour is directly determined by influences from three possible sources: habitual, intentional and situational. The habitual processes consist of schemata, heuristics and associations (Klöckner and Blöbaum, 2010). The difference between the three lies in the explanation of how the automated behaviour is created. Schemata are based on the idea of a 'blueprint' of behaviour for certain situations. Heuristics are seen as simple decision rules and associations are strengthened neural connections in the brain between parts that are often activated together (Klöckner and Matthies, 2010).

The Intentional processes consist of intentions, attitudes and beliefs. These are connected in a hierarchical structure where intentions are affected by attitudes, which again are affected by beliefs (Klöckner, 2010). Objective constraints enable or limit the behaviour directly, whereas the subjective or ipsative constraints are the factors the user considers to be relevant for their behaviour (Frey, 1988, Klöckner and Blöbaum, 2010). The objective constraints form the basis for what the user perceives, but subjective constraints can also include factors that are not objective (Frey, 1988). In addition to affecting the behaviour directly, the situational influences also affect the habitual, intentional and the normative

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processes. The normative processes have an indirect effect on the behaviour through affecting the habitual and intentional processes, and consists of personal norms that are affected by subjective/ social norms and values (Klöckner and Matthies, 2010).

The CADM provides an overview of the factors affecting sustainable behaviour. It can be questioned if it really is encompassing all the relevant factors, as for instance affect, which is included in Triandis theory, has been left out of the CADM. The authors of the model also indicate such limitations, as it is presented as a first version of a comprehensive action determination model. Nevertheless, the combination of its relative complexity and ability to predict behaviour in empirical studies makes it a promising framework to apply in this study.

4. When to apply design strategies

Now that a structuring of the design strategies and a suitable behaviour model has been identified, it is possible to combine the insight from the two. Can knowledge about the factors that are affecting behaviour help us make informed decisions about in what situations different strategies for designing sustainable behaviour are likely to be effective? To investigate this question, the following section of the paper contains an analysis of the factors identified by the CADM and how they affect expected effectiveness of design strategies according to the division of control between the user and the product.

4.1 Situational Influences

The first factor to investigate is situational influences, which are constraints and possibilities created by the context or the product itself. The way the product is designed, or the way the context around affects the interaction with it, determines the constraints and/or possibilities the user experiences when using the product. It also affects the user's perceived behavioural control. Are there limitations or possibilities among the capabilities of the user? Are there aspects in the usage situation or the context of the usage that enable or limit certain types of behaviour? This is already topic of user centred design literature (see for example Preece et al., 2002) and is commonly integrated in design processes (see for example Maguire, 2001); understanding the context can predict that the effectiveness of design strategies.

According to the CADM, situational influences consist of objective and subjective constraints. Objective constraints are something that is actually constraining. Subjective constraints are something that is perceived to be constraining. No matter if the constraints are real or only

perceived, they can strongly affect a user's behaviour, including the amount of attention the user is able or willing to give the interaction with a product. For instance, if a product is designed to be used while the user is driving a car, it is crucial that the product is possible to operate with only one hand and suddenly can be left alone without this causing any problems. It is also important that the interaction with the product does not require much attention or reasoning from the user, as he should focus on driving. Both these concerns are already identified and included in standard design processes and will directly say something about the applicability of different strategies. However, as earlier described, there seems to be a tendency that the more control the user has, the more cognitive load the interaction requires. Based on this assumption, the understanding of how much attention the interaction with the product can demand, can be a strong indicator of how much control the user should have.

4.2 Intentional Processes

In 2000 Paul Stern presented the Attitude-Behaviour-Context theory (ABC theory) discussing how contextual factors affect the influence attitudes have on behaviour (Stern, 2000b). The contextual factors consist of external factors, such as laws and regulations, community expectations and global variations (e.g. interest rate and oil prices), but also of the capabilities and constraints provided by the technology and built environment (Stern, 2000b). This is similar to what Klöckner and Blöbaum (2010) call situational influences. Stern implies that when the context affects the behaviour strongly, positive or negative, the attitude has little influence on the behaviour. But when the context effect is small or neutral, the attitude of the user plays a significant role for the behaviour. He describes this as an inverted U-shaped function, as shown in figure 4.

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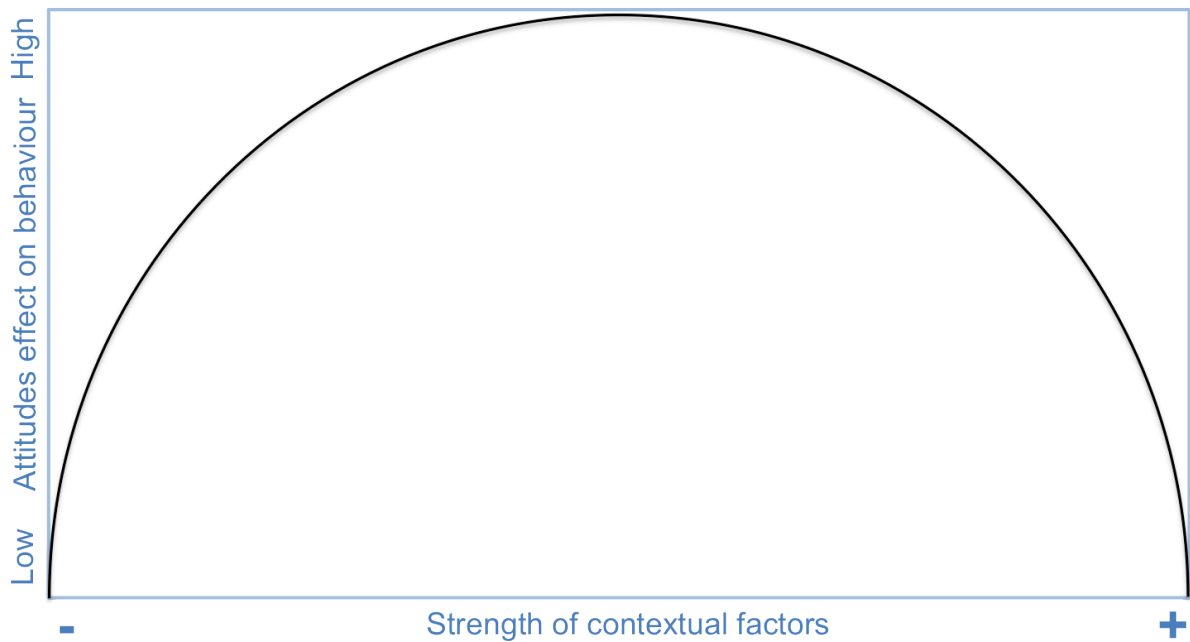
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Figure 4, Illustration of the ABC theory

In other words: if the external factors or the design of the product make it very easy to behave in a certain way, or difficult to not behave that way, people will behave this way no matter what their attitude is towards the behaviour. The opposite is the case when the context makes the behaviour difficult. If something is impossible to do, people will not do it, no matter how much they want to.

As already pointed out, the intentional factors in the CADM are interconnected in a hierarchical structure. "The intentional processes capture all aspects of deliberate decision making based on knowledge and beliefs about product characteristics, the resulting attitudes about it, and forming an intention to buy a certain product" (Klöckner, 2010). This relation between the factors also seems apparent if the logic reasoning in the ABC theory should be applied on intentions or belief. Based on this, it can be assumed that the ABC theory really discusses how the strength of the context affects deliberate behaviour decisions.

This points out an interesting aspect of the division of control discussed in the first part. As the strategies leave varying control to the user, it is reasonable to assume that it will be beneficial to use strategies where the degree of control for the user is corresponding with how much the user's intentions, attitudes or beliefs are in line with the intended behaviour.

The following section aims at investigating what the ABC theory implies, described from the viewpoint of design for sustainable behaviour. From this perspective, the strength of the contextual factors can be seen as how strong it forces the user to behave a certain way. This division of control is represented by three different ways the strategies try to change the behaviour, as proposed in figure 2: informing, persuading and determining.

On the informing end of the scale, the user is completely in control but receives information or feedback about the behaviour or the consequences of it. For this to be effective the user has to take in the information, and be willing to change the behaviour. This implies that the user has to have positive attitude towards the intended behaviour. This is supported by McCalley and Midden's conclusion that feedback only is effective if the user has a goal that the feedback helps to achieve (McCalley and Midden, 2002). It is of course possible to try to change the beliefs of the user, and thereby the attitude and intentions, by providing the user with information. How likely this is, will depend on how strong the beliefs of the user are and whether the user is open for changing beliefs or not (Verplanken and Wood, 2006).

In the persuasive part of the scale, the user is still in charge, but the product takes more control by making the desired behaviour the easiest or most intuitive. These strategies can be assumed not only to be effective on users with a positive attitude but also on users who do not have a particular attitude. As the desired behaviour is the easiest, this is what the user can be expected to do, as long as they do not make an effort to behave in another way. If someone chooses to make such an effort, we can assume that they have a negative attitude towards the intended behaviour. This could either be because they believe that the intended behaviour is wrong, or it can simply be because they have positive attitudes towards a different behaviour that are more important for them. This effect was also identified by Paul Stern, who found that "environmental significant behaviour can also be affected by non-environmental attitudes" (Stern, 2000b).

The determining strategies take the control away from the user by restraining certain behaviour or automatically performing actions. This can either be apparent to the user or be done without the user being aware of it. Because the behaviour is not the result of the users attitude, we can assume that this strategy can be effective on all the above-mentioned attitudes. If the users become aware of the behaviour or the outcomes of it, users with negative attitudes might choose not to use the product or service.

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Summarizing the three attitudes identified above:

•   Positive users are users that are willing to do an effort to behave sustainable.

Example: If they are in a hotel, they will make sure that the towels are hanging so they will not be changed. Even if they might be a bit dirty.

•   Neutral users are not willing to do an effort, but don't mind if their behaviour is sustainable.

Example: If the towels are clean and they remember to hang them up they'll do it, but they don't really mind if they are on the floor.

•   Negative users have beliefs or attitudes that make them negative towards the intended behaviour. This can either be directly towards the goal (in this case sustainability) they want to act un-sustainable as a principle, or they might just have other priorities such as comfort or economy.

Example: They would always throw the towel on the floor to have them changed. As they have paid for the hotel, they want to get the maximum out of it. They would want to change the towels even if they were perfectly clean.

However, it is problematic to categorize the attitude of a person as either positive, neutral or negative. In reality we could have unlimited variations to how positive or negative a person's attitude is towards a given behaviour. The above analysis is in other words only a logic construct to help investigate how likely the effectiveness of a strategy is, depending on its division of control. The resulting hypothesis of the relation between user attitudes and the division of control can be simplified to the following model (Figure 5).
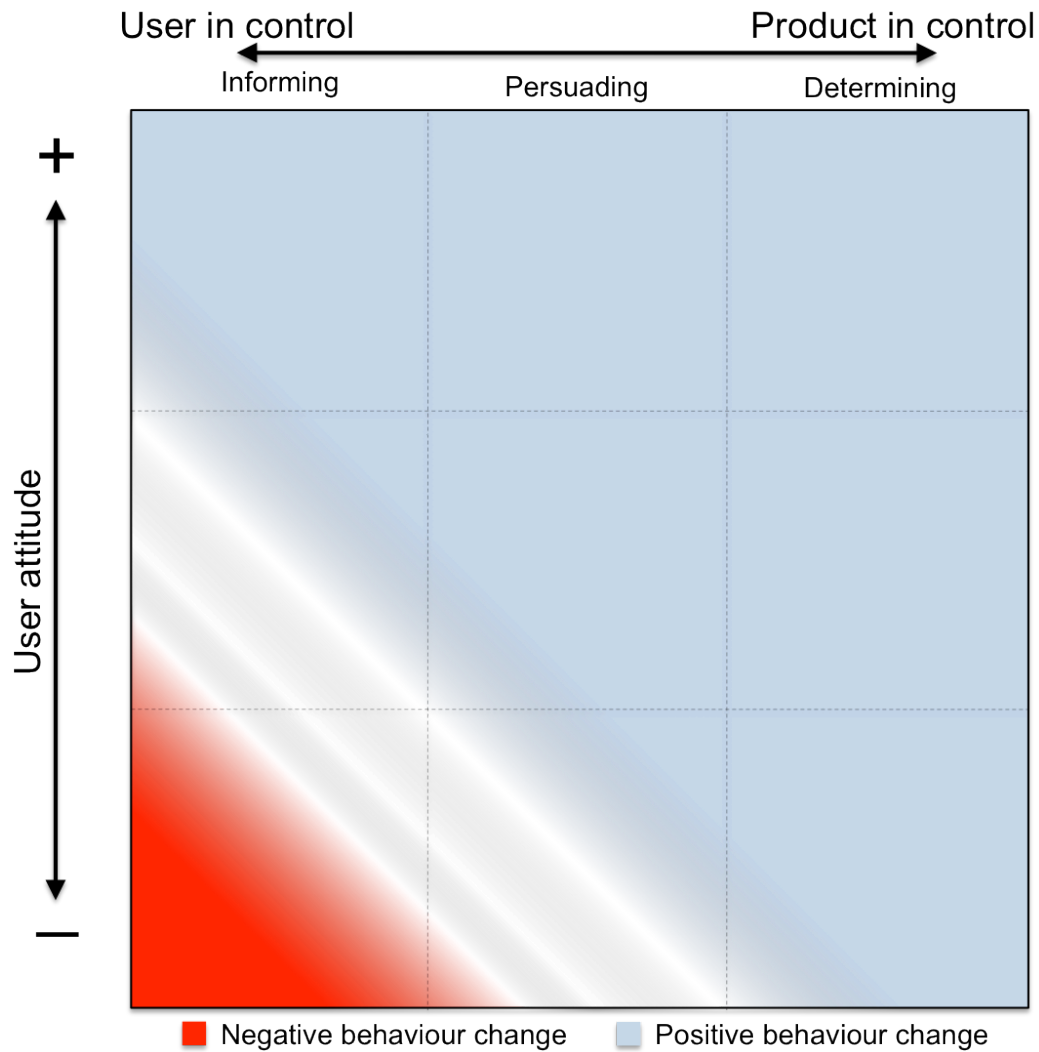
Figure 5: Relation of user attitude and division of control

This model is based on the viewpoint that "if the investigator chooses to observe a single action with respect to a given target in a given context in order to obtain correspondence, the attitude also has to be very specific (Ajzen and Fishbein, 1977). In other words, it is important to identify the attitude of the user towards the specific behaviour of interest, and not the general value of the user. This may result in varying attitudes from the same user depending on the behaviour in focus. Therefore, if this should be used as input for selection of design strategies, it is important to investigate attitudes towards the specific, intended behaviour.

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4.3 Habitual Processes

The next source of factors influencing behaviour is habitual processes. As earlier pointed out, Bhamra et al. focus on change of habits in their comparison of design strategies and psychological theories. In their model, a connection is made between the stages Anderson (1982) identified in the formation of a habit, and the level of control the user has over his/her behaviour. As the reasoning behind this division is unclear, it is difficult to include this result in the current research. However, the understanding of habits has some other consequences for the choice of design strategies.

For the purpose of this analysis, we assume that all the three habitual processes can be treated the same way and considered as simply being habits. There are several reasons for this. First of all, the literature describing strategies for braking habits (Verplanken and Wood, 2006, Jackson, 2005, Jager, 2003, Robertson, 1967) does not make a distinction between the different habitual processes. As this literature is the primary source for the analysis, it is problematic to make such a distinction. In addition, the automated effect the habitual processes have on the behaviour is the same and there are reasons to believe that the formation of all of them have to go through the step of successfully performing the behaviour (Klöckner and Matthies, 2010). If future research uncovers properties of the different habitual processes that are crucial for the selection of design strategies, another analysis should be conducted including this distinction.

Before analyzing habits, is it important to be aware of an aspect pointed out by Jager. "The habitual behaviour in question has been performed for the first time at a given moment" (Jager, 2003). In other words, before the behaviour has become habitual, it is affected by the same factors as any other behaviour and is subject to the situational and intentional processes. This will also be the case if the habit is broken and the behaviour no longer is habitual (Jager, 2003). Based on this, two alternative directions the design strategies might need to deal with habits become apparent. In the cases of "bad" habits, it can be relevant to break the habits and make the behaviour subject to situational and intentional processes. In case of "good" behaviour, it can be relevant to ensure repetition by making it habitual. Or as Verplanken and Wood (2006) points out, interventions can disrupt old habits and establish new.

The creation of habits is assumed to go through stages, such as the once previously described by Anderson. Both Klöckner & Matthies (2010) and Jager (2003) identify that

repetition is crucial in the formation of the habit. Jager also points out that the context around the behaviour should be similar from one time to another and the direct outcome of the behaviour should be satisfying for the user. "The closer the reinforcement follows after performing the behaviour, and the more often a reinforcement follows after performing behaviour, the stronger the stimulus-response relation or script gets" (Jager, 2003). Even though the design of the product can support the formation of circumstances that might trigger the script, this is a complex matter as the context of the behaviour is often hard to control. The positive reinforcement is however something that could be created by the product and therefore is a factor to look for in the choice of design strategies. This type of strategies are what Bhamra et al. (2008) identified as Eco-Spur, or Lockton et al. (2010) identified as Rewards.

The purpose of breaking a habit is to make the user conscious of the behaviour and therefore depending on his/her attitude or create new, sustainable habits. In other words is it crucial that the intentional or situational factors lead to a more positive behaviour and habit, once the old habit is broken. There are several different strategies and approaches for breaking a habit. Verplanken and Wood present three interventions for policy makers to change habits, Downstream, Downstream-plus-context-change and Upstream. Downstream interventions are information campaigns, and are argued to have limited ability to change behaviour. If the information is presented at the moment when the circumstances that trigger the habit are being changed, they are much more likely to be effective. These are referred to as Downstream-plus-context-change interventions. The most effective interventions however, are Upstream interventions, where something in the performance environment is being changed (Verplanken and Wood, 2006). The latter one is also recognized by Jager, who points out that removal of a stimulus, might stop the "script" from being activated. He also identifies that change in the experienced outcome of the behaviour or making the behaviour impossible will break the habit (Jager, 2003). The idea of making the behaviour impossible is one possible consequence of the type of strategies where the product is in control. Jager's notion of practical and ethical problems connected to such strong interference is also matched in the design literature by for instance Pettersen and Boks (2008a) or Lilley et al (2005).

Thomas S. Robertson (1967) identified another aspect of how the design of products can break habits. He classified innovation according to its effect on established patterns, and

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proposed that innovations can be classified as continuous, dynamically continuous or discontinuous.

• Continuous innovations are minor alterations of products, such as fluoride toothpaste, and have the least disrupting influence on established patterns.

• Dynamically continuous innovations are the creation of a new product or the alteration of an existing, such as an electrical toothbrush, and have more disruptive effect.

• Discontinuous innovations are establishments of totally new product types, such as the introduction of a new chewing gum, which makes brushing of teeth unnecessary. This will establish totally new habits.

From an interaction design point of view, this classification points out what might already be implicitly understood. The more innovative, or different from the previous, the interaction with a product is, the stronger is its ability to break a habit involving the product. This idea of removing the triggers for the habit is the same as Jager, and Verplanken and Wood identified above. The product, or the way to interact with it, can be among the factors that trigger a habitual behaviour, and because the product often is in the focus of the user, it can be one of the most important. In other words, the new product's ability to break old habits will be related to the novelty of the interaction with the product. The opposite should also be true. If the aim is to maintain a habit, a new product should avoid novelty in the interaction.

4.4 Normative Processes

According to the CADM, the normative processes do not affect the behaviour directly, but are affecting both the Intentional Processes and the Habitual Processes (Klöckner and Blöbaum, 2010). Personal norms are stable over time and are representations of one's value system and mediated by social norms (Klöckner and Matthies, 2010). Schwartz (1977) states that norms affect attitudes as "evaluations of acts in terms of their moral worth to the self." In other words will norms affect the choice of design strategies, by being the criteria the user applies to evaluate if a given solution is acceptable or not. This can disqualify the strategy, even if it otherwise would be likely to have the desired effect, if it for instance violates the user's value of freedom by forcing certain behaviour. It can also be experienced as a positive reinforcement of a habit, if the user experiences that the behaviour or the outcome of it, supports his/her values or norms.

5. Discussion and Conclusion

This research suggests a potential for using knowledge about how behaviour is determined, to understand when different behaviour changing strategies are likely to be effective. The analysis investigated how the division of power could be distributed for different relevant user or context characteristics, identified by behavioural psychology. This resulted in the following suggested guidelines for when positive behaviour change can be expected:

• The less cognitive workload the context allows the user to allocate to the product, the less control the user should be given over the interaction.

• The more a person's beliefs, attitudes and intentions are in line with the intended behaviour, the more control of the behaviour can be given to the user.

• If the user has a positive behaviour that would be beneficial to make into a habit, the product should try to maintain the context around the behaviour as stable as possible. One of the most important means of doing so is to make sure the way the user interacts with the product is stable. The product should also give the user positive reinforcement as often and as closely related to the behaviour as possible.

• If the user has a 'bad' habit that need to be broken, this can be done either by making the habit impossible, changing the experienced outcome, or stopping the automatic process from running and thereby making the behaviour subject of conscious deliberation. For making a certain type of behaviour impossible, the strategies where the product is in control should be considered. To make the experienced outcome negative, it is necessary to identify which current outcome acts as a positive reinforcement of the behaviour. This could be something directly beneficial for the user, but it could also support the user's values or norms. All changes in a product might make the usage situation unfamiliar and stop the automatic processes. Naturally, the larger the change, the greater the chance of breaking the habit. One of the most effective aspects to change is the way the user interacts with the product. The more novel the interaction with the product is, the higher the chance of being able to break the habit.

• The product, interaction, outcome or behaviour should not violate the user's values or norms. In addition to being a reference to check if specific strategies will be accepted, this may provide general insight into how much control the user will accept the product to have.

When considering these guidelines, is it apparent that some, or perhaps all of them already are implicitly or explicitly known and currently included in design processes. However, the foundation in behavioural psychology does not only provide a possibility for deeper

understanding why this might be true, but can also help understand how to choose the best design strategies.

However, the analysis and guidelines suggest that further elaboration of this investigation is necessary. It shows that the distribution of control is a relevant dimension for the purpose, but it is not sufficient by itself. The analysis identifies, for instance, that the level of obtrusiveness and innovation/novelty may be other relevant dimensions. To gain a more comprehensive and specific understanding of when different strategies are likely to be successful, more dimensions should be investigated. These could include the dimension mentioned above, and/or other dimensions for the script concept identified by Jelsma (2006) as well as the dimensions proposed by Lockton et al. (2010). The guidelines identified by this study, and possible future studies with more dimensions, should be connected to the real world through empirical studies. This will not only be a way of testing the theoretical work, but can also result in further elaboration and deeper insight.

Another possible direction to elaborate this study further could be to look at other theoretical frameworks for the factors that are affecting behaviour. Understanding reasons for behaviour has been the topic of extensive research across multiple disciplines, resulting in a "comprehensive and rather unmanageable range of literature" (Pettersen and Boks, 2008b). Investigation into sociology, anthropology, marketing or political science, might contribute with additional understanding and dimensions.

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