


Please cite the Published Version

Niedderer, Kristina  (2018) Facilitating behaviour change through mindful design. In: Design for Behaviour Change: Theories and Practices of Designing for Change. Design for Social Responsibility . Routledge, London, pp. 104-115. ISBN 9781315576602 (ebook); 9781472471987 (hardback); 9780367669874 (paperback)

DOI: <https://doi.org/10.4324/9781315576602-9>

Publisher: Routledge

Version: Accepted Version

Downloaded from: <https://e-space.mmu.ac.uk/624347/>

Usage rights:  In Copyright

Additional Information: This is an Accepted Manuscript of a book chapter published by Routledge in Design for Behaviour Change: Theories and Practices of Designing for Change on 23rd August 2017, available online: <http://www.routledge.com/9781315576602>

Enquiries:

If you have questions about this document, contact openresearch@mmu.ac.uk. Please include the URL of the record in e-space. If you believe that your, or a third party's rights have been compromised through this document please see our Take Down policy (available from <https://www.mmu.ac.uk/library/using-the-library/policies-and-guidelines>)

Chapter 9

Facilitating Behaviour Change through Mindful Design

Kristina Niedderer

Abstract

This chapter offers an introduction to mindful design and its potential to promote responsible behaviour change. While it is recognised that design changes users' behaviour, design often has inadvertent consequences which are not considered at the point of designing, and which can cause significant social, environmental or other issues later. In this chapter, it is argued that mindfulness – as an attitude of awareness and attentiveness – can be embedded in design and as such can help users to make more responsible decisions through the use of mindful design. The argument proceeds through the analysis of the concepts of mindfulness and mindful design, and is supported by a number of examples to explain the role and position of mindful design as a useful approach to designing for behaviour change.

Keywords: behaviour change, mindful design, mindfulness, emotion, sustainability

Introduction: The need for mindful behaviour change

Behaviour change is increasingly recognised as an important means for building a sustainable future (Stern 2006: xviii), not only concerning environmental sustainability but also with regard to social and economic issues (Chick 2012). Design, in turn, can strongly influence behaviour change, because design surrounds us ubiquitously. Design is everywhere in the things we surround ourselves with at home, at work, during leisure activities, during travel. All subtly influencing our actions.

Dependent on the perspective taken, design can be seen as a problem or as a solution to many of the current social, economic, or ecological issues. Indeed often design can have both at once desirable and undesirable consequences. For example, cars may be seen to provide solutions to social integration and mobility while at the same time causing environmental issues through pollution and resource depletion (Akerman et al 2009: 2ff, Banister 2008). Or, while traditional computer use has been shown to lead to sedentary behaviours associated with problems of obesity (Proper et al 2011), its use for activity online games, exergames, etc. can help increase sporting activities and counteract the first effect (Staiano and Calvert 2011). Similarly, computer use can on the one hand increase our connectedness e.g. through e-mail and chat room/instant messaging, on the other it can increase symptoms of depression e.g. when increased time is spent on internet shopping, video games, etc. (Blaschke, Freddolino and Mullen 2009, Grieve et al 2013, Morgan and Cotton 2004).

Because of the versatility of design and the plethora of its often unintended uses and serious consequences, it is essential that the behavioural scope of design is considered carefully by both designers and users alike to ensure responsible decision-making and actions by all involved. In order to encourage responsible decision-making, it is necessary to understand the complex interactions between people, objects and their environments as well as their motivations. Designers have developed different models to understand user behaviour, and to facilitate desired behaviours via design. Several of these models are discussed in the surrounding sections of this edited text. Key strategies for behaviour change put forward attempt to enable, motivate, and or constrain behaviours (see Lockton et al 2010, chapter 6).

while design strategies may integrate principles of seduction, persuasion, coercion or prescription into objects (see Tromp et al 2011).

However, the ability to design for appropriate behaviour remains challenging because of design's versatility and the unpredictability of users' actions (Tromp et al 2011). While designers can imbue objects with affordances and strategies for behaviour change, they cannot predict the use made of them because of the user's ability for arbitrary action. The argument here is that it is important therefore not just to design the object's affordances in terms of enabling, motivating or constraining the users actions, but to design for responsible decision making of the user – as part of their motivation - with regard to their actions with the object. The use of mindfulness and its integration into design as 'mindful design' offers a way of promoting such responsible reflection.

The chapter first reflects on the nature of design and how it influences user behaviour, prior to introducing the concept of mindfulness. It discusses what mindfulness entails, why it is useful to achieve responsible decision-making and action, and how designers can embed mindfulness into design to create 'mindful design'. The chapter continues with a number of examples to demonstrate the application and affect of mindful design with regard to responsible behaviour.

Why mindfulness?

Historically, product design has arguably been associated with the desire to conceive and manufacture functional artefacts faster and cheaper, making them more affordable to the masses, (Smith 1776[2010]: 29; Ligo: 1984). Functionality can be understood to include anything from practical function, such as being able to drink out of a glass or sit on a chair, to symbolic function, such as the purpose of items to convey style, or status, or memory, etc. (Ligo 1984: 21ff, Niedderer 2004: 61ff).

Although design has developed far from its humble beginnings, these two basic premises, mass-production and functionality remain, and has led to its ubiquity in our lives. This ubiquity means that design constantly surrounds and influences us, while its functionality directs our actions, leading inevitably to adapting our behaviours to it, causing behavioural changes at every level (Norman 2002: x, 10ff, 40ff). For example, the use of a car will allow us to move more flexibly, perhaps to go to work further away from our home, visit friends, go shopping etc. Because of its convenience, we will often surrender to its use unthinkingly, while we could perhaps chose another means, such as public transport or cycling, that might be cheaper, more efficient to reach our destination, or be more environmentally friendly, if we thought about it. Similarly, mobile phones connect us to people at the other end of the line, but often leave us oblivious to our surroundings and whether we interrupt conversations and interactions in our immediate surroundings, or even ignore traffic while walking or driving (Srivastava 2005, Niedderer 2014).

These examples as well as the ones mentioned above demonstrate that functionality is not neutral in that

every act of [using] design involves choices that are deeply interested, in the sense that they necessarily serve someone's needs before (or to the exclusion of) those of other parties. (Greenfield 2011)

This means while design has a desired direction, it is important to acknowledge the existence of often unintended or unexpected 'side-effects' and consequences. Jelsma posits that designers should take moral responsibility for the actions that take place as a result of human interactions with artefacts, intentional or not, because

'Artefacts have a co-responsibility for the way action develops and for what results. If we waste energy or produce waste in routine actions such as in the household practices, that has to do with the way artefacts guide us' (Jelsma 2006: 222).

If there is the need for designers to take responsibility and direct behaviour change, then the obvious question is how designers can do so. Dorrestijn (chapter 4), with the *'Product Impact Tool'* offers guidance for designers via four aspects of conceptual, psychological, physical, and technical guidance for the user. Dorrestijn's approach presumes the responsibility with the designer. By contrast, in this chapter, I want to investigate more closely the interplay between the responsibility of the designer – via a product's affordances – and the user's responsibility and freedom of decision making. In order to do so, we need to look at the nature of design and how its functionality directs users' actions.

The functional approach, which underpins most design, is focusing the user on the intended action with an object (Niedderer 2004: 61ff; Norman 2002: 40). This function is intentionally created by the designer through the physical and semantic properties of the object. In addition, a semiotic message can be added which can be aligned or separate to the first two. For example, the physical shape of a mug affords holding liquid, the handle signifies an aid for lifting the mug to the mouth. A print on the mug might support this message, e.g. through printed lips and a hand at the rim and handle respectively indicating where to put your lips and hands, or through saying 'drink me' in an Alice-in Wonderland style fashion, thus supporting the intended practical function either through indexical or instructional signs. On the other hand, the mug may be embellished with a print that says 'poison' – adding some frisson and reflection about whether or not to drink the contents of the cup. In a third scenario, the user might not notice the print at all or ignore it and use the mug as a penholder, a dice shaker, a flowerpot, or to put a treasure into it and bury it.

The mug example shows that while an object's semantic and semiotic messages can support its use or instil reflection on its use, the physical function affords many more options than ordinarily intended by the designer because of the ambiguity of the affordances that any one object owns (Norman 2002; Niedderer 2004: 61ff). It seems therefore that largely the designer cannot stop the user to make use of an object to their end. However, what the designer can do is to create awareness and reflection of the possible actions on the part of the user to encourage the user to take responsibility. This is to create mindfulness of the user's actions with the object and their consequences (Niedderer 2007).

Mindfulness has been defined many times but for our purposes, following the Western psychological tradition of mindfulness (Langer 1989, Langer and Moldoveanu 2000), it is understood as a process of creating awareness and attentiveness "to bring one's full resources to a cognitive task by using multiple perspectives and attending to context, which creates novel ways to consider the relevant information." (Luttrell, Briñol and Petty 2014: 258). For example, a person routinely commuting to work by car, when confronted with the need to take more exercise to improve their health, if mindful, might look at the bigger picture and decide to cycle to work in future thus not only increasing their exercise but at the same time reducing their CO2 emissions. In this way, the health issues are not seen as something negative, but as an opportunity to improve one's lifestyle and responsible behaviour overall. By contrast, a mindless person might decide to go to the gym once a week taking the car, thus adding an extra journey while getting exercise rather less frequently.

Applying mindfulness to design, we can define it as referring to the awareness and attentiveness of a person (user) towards the object they are interacting with, towards

their environment in the widest sense and towards the consequences of their actions with the object for themselves and others (Niedderer 2007, 2014). It is useful to integrate mindfulness into design to facilitate behaviour change, because there are four key behavioural factors, which need to be addressed to facilitate behaviour change. According to Stern (2000: 416) these include:

1. attitude,
2. external context,
3. personal capability and
4. habit/routine).

Mindfulness comfortably addresses all four of these, because it draws attention to and induces reflection of one's pre-conceptions, one's own actions and the external context (Langer 1989). It thus allows (re-)considering one's habits/routines and inherent attitudes in relation to the wider context, and in turn to re-assess one's personal capabilities for change.

Mindful design and how it works

Mindfulness has traditionally relied on meditation and education, because the state of mindfulness is elusive (Langer 1989: 2, 9ff) and it is necessary to break through established patterns of experience and preconception to achieve mindfulness (Langer 1989: 19-42). Meditation or education have been used as an external agent to disrupt these patterns and to open them to (re)inspection (Langer 1989: 81-114; Udall 1996: 107). Usually administered through a trainer or therapist to enable the state of mindfulness, this makes mindfulness reliant on external agents, which are not available generally.

By taking the role of 'external' agent, design can offer a valuable alternative or addition because it can be available in everyday contexts. Embedding mindfulness within design is useful because of design's ubiquitous role, which means mindfulness can be integrated directly into everyday life. For example, recent studies on computer-supported mindfulness found that appropriate design interventions can significantly surpass the effectivity of traditional mindfulness training (e.g. Chittaro and Vianella 2013).

Besides its common application for therapeutic purposes, mindfulness - when embedded in design - can be applied to a broad variety of problems including health, sustainability, social issues, safety and crime prevention. Mindful design is based on two key principles: firstly it requires raising attention through a 'disruption' of the normal pragmatic function, i.e. of our expectation of how the object at hand works. Secondly, it needs to direct this attention to the content to be reflected on through some feature, which is called 'thematisation' (Niedderer 2007, 2014).

Function can be disrupted on either practical or symbolic level, or both. The disruption of the practical function is used regularly e.g. as part of safety features such as warning notices on computers (e.g. when saving a document) which briefly disrupt our consciousness, draw our attention to the desired content (thematisation), and offer/require an additional action to complete the command (e.g. 'save/don't save/cancel') following reflection upon the thematisation. Similarly, the symbolic function can be used to raise the user's attention: in a design experiment, a stripe or patch was painted in front of cash machines (or other counters) to denote a 'safe space' to deter thieves or intruders (Gamman and Thorpe 2012; Chapter 19). Here, there is no physical barrier to deter anybody standing too close to the person using the cash machine. Instead, the design makes visible, symbolically, the social expectations of personal (safe) space and related behaviours of keeping distance.

Any trespasser is seen to break these norms, enabling action to be taken to re-establish the norm.

Content, choice, and complexity

The disruption within mindful design only works when it is accompanied by the 'thematisation'. The thematisation is the feature that directs the attention (which has been raised through the disruption) towards the desired content for reflection, and which must connect with the solution to the disruption. In the case of the computer safety feature, the thematisation is provided with the sentence on screen ('Do you want to save the changes you made to ...?'), which explains why the process in question has been interrupted and offers different solutions in form of the clickable buttons (e.g. 'save/don't save/cancel'). The availability of different solutions is important, because they offer choice. Choice makes us mindful because it requires conscious reflection on the different options available (Langer 1989: 123), which in turn can lead to (Langer and Moldoveanu 2000: 2):

1. a greater sensitivity to one's environment,
2. more openness to new information,
3. the creation of new categories for structuring perception, and
4. enhanced awareness of multiple perspectives in problem solving.

As a point of caution, while adding more choices can increase reflection and thus mindfulness, too many options can make a design potentially confusing or annoying to use (Norman 2002: xii). Therefore, it is important to maintain a balance between clarity of message and complexity of reflection.

In addition to content and choice, the proposed solutions can have different levels of meanings, adding complexity, helping to question established concepts. For example in the case of the mobile phone, mindfulness might focus on the awareness of the different levels of interaction that are engendered through the phone: such as the interaction with the person at the other end of the line, that with the speaker's immediate social or environmental context which might be influenced by the first interaction, as well as the speaker's voice level.

The thematisation thus has three 'mechanisms' or 'features' to guide attention, which comprise content, choice and complexity (Niedderer 2014: 348-353). Of these the first two are essential features of the thematisation, the third can offer an additional level for reflection.

Emotions and mindfulness

One important issue regarding mindful design is that mindless behaviour regularly tends to be driven by emotions (Niedderer 2014: 354-357). Emotions, as a complex system linking actions, causes and consequences, have evolved as a protective mechanism to allow for quick reactions, guiding our judgment without requiring conscious decision making (Keltner and Gross 1999: 472-3). Through 'brief, rapid responses involving physiological, experiential, and behavioural activity [they help] humans respond to survival-related problems and opportunities' (Keltner and Ekman 2000: 163).

Because emotions are quick and don't require deliberate decision making, they are open to mindlessness because they promote a single perspective, e.g. an emotional response established in one situation may be unthinkingly transferred to a new situation where it might be entirely inappropriate. For example, answering one's mobile phone might be instilled by curiosity or by a feeling of duty: when on one's own and in a secluded space, taking the phone may be appropriate. The action of taking the phone is 'regarded as the 'functional' emotional action, that enables relief of the original emotions (curiosity, worry). However, if for example on a busy road or

driving, in the quiet coach of a train, or in conversation with others, answering one's phone would not be appropriate. In the first case, it might be a safety issue, in the second and third case it might be a lack of consideration and respect for fellow passengers or colleagues. Therefore in these cases attention to functional action only can lead to mindlessness. The challenge for design then is to take account of circumstances that surpass functional action.

While emotions can add to mindlessness, they can also be used as an incentive to support the function of mindful design (Niedderer 2014: 356). This is because it is possible for opposing emotions to cancel each other out (Niedderer 2014: 356). As indicated above, emotions generally are a response to a situation, and in turn lead to emotional actions to either maintain or change the situation. For example, if the phone rings, we take it to satisfy our curiosity or worry. If we cannot take it for any reason, we might react with frustration. In response to such situations, there are certain emotional actions that appear 'non-functional' in that they don't achieve the desired goal (taking the phone) but which offer a way of reducing emotional tension or negative emotion (frustration) within an individual. Although they do not change the situation, which has caused the negative emotions, they are able to generate positive emotions which can partially overlay or cancel out the original negative emotions (Cohn, Fredrickson, Brown, Mikels, and Conway 2009: 8).

This discussion has provided an overview of how mindfulness can be embedded within design in order for design to act as an external agent to instil mindfulness. Mindful design incorporates two mechanisms (disruption and thematisation), which can work on different levels of content, choice and complexity. Furthermore, emotions play an important role in that on the one hand they may lead to mindlessness, and on the other hand they offer a way of promoting mindfulness and embedding it into design through utilising both functional and non-functional emotional actions as an incentive. For example in the 'safety feature', the fear of losing one's document, awareness of which is engendered through the disruption (banner), is ameliorated through the feeling of relief of the same feature and the safety options provided through it.

Mindful Design – Guidance for Designers and Examples

Having introduced the different aspects of mindfulness and how they can be embedded within design, this section is concerned with the creation and application of mindful design. Essentially, there are two ways in which the understanding of mindful design can be useful: firstly to analyse existing designs to better understand them, and how and why they may work (or not) with regard to mindful behaviour change. Secondly, understanding mindful design can be used to identify and analyse relevant situations and to create designs to address them. Not all steps will be applicable to each case.

Mindful Design Guidance

The framework for mindful design has three stages: 1. Identifying the design problem, 2. Identifying mindful solutions and 3. Implementing mindful solutions in design. A revised and simplified version from Niedderer (2014: 357-360) is offered below.

1. Identifying the design problem

The design problem in mindful design is understood to be a situation or interaction where there is a lack of mindful action or intent, which can be improved with regard to the awareness and choices of the situation, rather than focusing solely on one determinate outcome.

Once a situation has been identified, there are several indicators that can be drawn on for its analysis:

- 1.1 The mode of interaction observed or to be addressed: human-object, human-human, and/or human-environment;
- 1.2 The emotions relating to the situation/interaction, including:
 - 1.2.1 Any emotional actions discernable: functional and non-functional;
 - 1.2.2 The nature of the emotions: positive, negative, appetitive, aversive, approach, avoidance, and any tensions;
 - 1.2.3 The levels of emotions relating to the identified emotional actions: individual, social, cultural, and any tensions between them;
- 1.3 From the (inter)actions and emotions, the underpinning premature cognitive commitments may be deduced.

On the basis of the analysis of these indicators, a judgment can be made as to the appropriateness of the (inter)actions in the context of the given situation, and thus with regard to the nature of the lack of mindful action.

2. Identifying mindful solutions

The second step focuses on identifying mindful criteria (content, choice, complexity) in response to the identified situation and its related indicators, as a basis for developing mindful design solutions that are able to create reflection. This includes identifying:

- 2.1 Different choices in relation to the (emotional) actions;
- 2.2 Different potential novel/ alternative perspectives related to the (emotional) actions;
- 2.3 Emotions that may serve as incentives or to cancel out inappropriate emotions.

3. Implementing mindful solutions in design

The third step is to implement the identified mindful solutions within and through design. It is likely to be easier to use and redesign relevant existing objects (or contexts) rather than introducing an new object into a situation, because of the likely greater acceptance. Identified mindful solutions are embedded into design objects or environments through the dual mechanism of disruption and thematisation:

- 3.1 Create awareness by disruption relating to the pragmatic or symbolic function. This must relate to the feature of the object or situation to be reflected on.
- 3.2 Create reflection on the content through thematisation using choice, complexity and emotions:
 - 3.2.1 Create choice by offering different options for responding to the function of the object. These may relate to both pragmatic and symbolic levels of function: individual functional or non-functional emotional action on the pragmatic level; social or societal emotions and their underlying norms or beliefs on a symbolic level.
 - 3.2.2 Create multiple perspectives and offer multiple level interpretations that are new/different to that of the individual emotional action and related premature cognitive commitments by embedding different functional/non-functional emotional actions. These may be referent to basic emotions or to different social emotions and/or to cultural norms and beliefs.
 - 3.2.3 Use positive emotions (e.g. positive, appetitive, approach oriented emotions) as a motivation to encourage desired action(s). They can work as an incentive or deterrent, or to cancel out any emotions/emotional

actions that are perceived as problematic either on the basis of empathy or by being perceived as a reward.

While previous research has focused on mindfulness in the social context, mindful design can also be applied in other contexts such as health, safety, sustainability and crime prevention. Mindful design can also work on several different levels of complexity forms from basic awareness on the (inter-)action with an object to awareness of multiple levels of social, cultural and environmental interaction. Several of the examples above have already been indicative of this. In the following, I provide three examples, drawn together from the above discussion, which demonstrate the broader application of mindful design at the three different levels at which it can operate, and with reference to the steps of the design guidance.

Examples

Mindful design – Level 1: addressing practical function and individual emotions

Returning to the safety feature of an everyday computer, as a simple example of safety design. In this example, the problem (1) is the danger of loss of information through inadequate human-object interaction (1.1), such as closing a document without having saved it, which is known to cause individual (1.2.1) negative (1.2.2) emotions such as e.g. fear, anger or frustration over losing information. In response to the problem, warning notices on computers (2) reminding us to save a document before closing it have become a common but powerful feature, which we heavily rely on and which offer us relief (2.3). Such features appear and briefly disrupt the requested function (3.1) if we do something that might cause us to lose information, as in trying to close a document without having saved it first. The computer raises our awareness by refusing the requested practical function temporarily (3.1) and brings up a banner that interrogates our action (3.2) that then requires an additional action to complete the command (3.2.1). The banner (3.2) alerts us to the content of the action and provides several choices (3.2.1 – e.g. 'save/don't save/cancel') for us to reflect on which action we really want to take. The choices are playing on our emotions in a rather simplistic but effective way, addressing our 'fear' and 'relief' of either losing important information or having secured it, and allow us to take the appropriate emotional action (3.2.3). This is a very simple example, but it shows how powerful and pervasive mindful design can be.

Mindful design – Level 2: addressing practical function and social values

Focusing on the example of the mobile phone, they can often be perceived as being used mindlessly (1). Such mindlessness is engendered because they are solely designed to focus the user on the person at the other end (1.1), leaving the user oblivious to their surroundings (1.1), to whether they interrupt conversations and interactions in their immediate surroundings (1.1), or even ignore traffic while walking or driving (1.1), thus causing tension between different levels of human interaction (1.2.3).

One of the most common issues found, is people 'shouting' into their phones, thus disrupting others around them (1). This phenomenon seems to arise from our imagination of talking to someone far away (1.3), which is intuitively transferred to the level of our voice to make it carry even though this is not at all necessary. Mindful design functions could easily be built in to cope with this phenomenon: for example, the phone could respond to 'shouting' by reducing the sound level of the speaker (3.1) until they reduce their voice, thus making them both aware of their actions and helping them to adjust to an appropriate level. This solution might of course be

somewhat contentious because the temporary reduction in sound level (3.1), which might cause the speaker temporarily not to hear the person at the other end, is likely to cause negative emotions (3.2.3) until they have adjusted their own voice, and the voice level in the phone returns to normal as a 'reward' (3.2.3). It would therefore be better to find a way of finding a design solution that would include (only) positive emotions, although that may not always be possible.

Another common issue is people taking their phones (1) when involved in another action or social interaction (1.1; 1.2.1). Here, when the mobile is relaying a call, it could put up a humorous message querying whether it is appropriate for the user to take the call at this moment (3.1, 3.2), showing different symbols dependent on the environment (in social company, near street crossing, etc.) (2.1, 2.2) and offering different options, e.g. of declining, of diverting to the answerphone, or to take the call (3.2.1). The humour of the message could offer an alternative emotion ('fun') to counter the ensuing emotions of frustration, anxiety etc. (2.3; 3.2.3) that might arise from not taking the call if the situation is not conducive.

The example of the mobile phone indicates that there can be tensions between the need of the individual, and the collective (1.2.3): The mobile phone in a meeting or public space, disrupts one conversation in favour of another, or disrupts the many in favour of the satisfaction of a single person (Srivastava 2005: 123). As explained above, these points could well be addressed through a mindful design approach. Indeed, some conceptual designs of mobile phones have started to address such points, but have not yet been realised commercially (e.g. Hemmert et al 2011) since many work through negative emotions which are not acceptable to phone companies for obvious reasons.

Mindful design – Level 3: addressing symbolic function and social values

The third example takes us back to safety design, but with a strong focus on social interaction. It is the example of a traffic junction in Drachten, The Netherlands (Webster 2007). Similar examples exist by now in London and Coventry the UK. This junction had a very high incident rate (1), which was not improved by further signage. Following the shared space model, the traffic planners finally decided to take away all signs (3.1), which improved the traffic safety of the junction significantly.

Analysing the design of the crossing from a mindful perspective, in this example it is not the actual physical function that is disrupted, but it is the symbolic rules which guide it (traffic lights, signage, or road markings) that have been removed (3.1). This causes awareness because the expected guidance is missing (3.2.1), and requires traffic participants to take an alternative perspective (3.2.2), which includes actively think about how to navigate their environment and to take responsibility for managing the traffic to keep themselves and others safe (3.2.1).

This creates a radical change in behaviour forcing the users to proceed with much greater caution within a shared-space intersection compared to a conventional intersection as the users are "mindfully" aware that all other road-users are in a similar 'uncontrolled' situation and have the same rights (2.2). It resulted in a clear improvement of the situation (Webster 2007). The design works because it causes individuals to take note of their social context, and by doing so it requires them to take responsibility and thus it creates a safer traffic environment. Overall, it appears that many examples of social design respond to, or can be explained by a mindful design pattern because they are reliant on social responsible action and reflection.

Conclusion

This chapter has introduced the concept of mindful design as an approach for designing for behaviour change. Mindfulness can be embodied in design through the design strategies of 'disruption' and 'thematization', which in turn draw on aspects of content, choice, complexity and emotions, to create awareness and reflection in the user. These strategies can be synthesised into a set of design guidelines in three stages: 1. Identifying the design problem, 2. Identifying mindful solutions and 3. Implementing mindful solutions in design.

The mindful design approach can help designers with the problem that they cannot predict, and design for (or against) all the uses to which users may put any objects or products and users' behaviours with them, without resorting to coercive or prescriptive design solutions. Mindful design can thus help make the user aware of their actions with the object and their social or environmental context in order to stimulate conscious and responsible action on the part of the user. Like all behavioural design approaches, mindful design is not appropriate for all situations, such as where absolute safety is required. Nevertheless, the benefits of the use of mindful design – as exemplified by the shared space crossing – are increasingly recognised and employed in a wide variety of situations and settings.

Acknowledgement

The chapter draws on work conducted over the last twelve years, in particular work published between 2007 and 2014, and which is referenced and acknowledged where appropriate in the text.

References

- Akerman, J., Banister, D., Dreborg, K., Nijkamp, P., Schleicher-Tappeser, R., Stead, D. and Steen, P. (2009). *European Transport Policy and Sustainable Mobility*. London and New York: Routledge.
- Banister, D. (2008). The sustainable mobility paradigm. *Transport Policy*, 15: 73–80. doi:10.1016/j.tranpol.2007.10.005.
- Blaschke, C.M., Freddolino, P.P. and Mullen E.E. (2009). Ageing and Technology: A Review of the Research Literature. *British Journal of Social Work*, 39(4): 641-656.
- Chick, A. (2012). Design for social innovation, *Iridescent: Icograda Journal of Design Research*, 2(1).
- Chittaro, L. and Vianella, A. (2013) Computer-supported mindfulness: Evaluation of a mobile thought distancing application of naive meditators, *International Journal of Human-Computer Studies*, 72: 337-348.
- Cohn, M. A., Fredrickson, B.L., Brown, S.L., Mikels, J.A. and Conway A.M. (2009) Happiness Unpacked: Positive Emotions Increase Life Satisfaction by Building Resilience, *Emotion*, vol 9, No 3, pp361-368 [preprint accessed 29 April 2012, from URL: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3126102/pdf/nihms-222302.pdf>]
- Gamman, L. and Thorpe, A. (2012). From Crime Scripts to Empathy Suits - Why role-playing and visualisation of user and abuser "scripts" regarding ATM crime can offer useful design tools to build empathy and catalyse design innovation. *Proceedings of DRS 2012 Bangkok*. Bangkok, Thailand: Chulalongkorn University, pp. 564-581.
- Greenfield, A. (2011). *Weeks 43-44: International garbageman*. New York: Urbanscale, 3 November 2011. URL: <http://urbanscale.org/news/2011/11/03/weeks-43-44-international-garbageman/> [accessed 25 May 2012]

- Grieve, R., Indian, M., Witteveen, K., Tolan, G.A., and Marrington, J. (2013). Face-to-face or Facebook: Can social connectedness be derived online? *Computers in Human Behavior*, 29(3): 604–609.
- Hemmert, F., Gollner, U., Löwe, M., Wohlauf, A. and Joost, G. (2011). Intimate Mobiles: Grasping, Kissing and Whispering as a Means of Telecommunication in Mobile Phones. *MobileHCI 2011*, Aug 30–Sept 2, 2011, Stockholm, Sweden.
- Jelsma, J. (2006) Designing 'Moralized' Products, in Verbeek, P.P. and Slob, A. (Eds), *User Behavior and Technology Development: Shaping Sustainable Relations Between Consumers and Technologies*, Springer, Berlin, 221-23.
- Keltner, D. and Ekman, P. (2000). Emotion: An overview, in Kazdin, A. (Ed) *Encyclopedia of Psychology*, Oxford University Press, London, 162-167.
- Keltner, D. and Gross, J. J. (1999). Functional Accounts of Emotions. *Cognition and Emotion*, 13(5): 467-480.
- Langer, E. J. (1989) *Mindfulness*, Addison Wesley Publishing Company, US
- Langer, E.J., and M. Moldoveanu. (2000a). The construct of mindfulness. *Journal of Social Issues*, 56(1): 1-9.
- Langer, E.J., and M. Moldoveanu. (2000b). Mindfulness Research and the Future. *Journal of Social Issues*, 56(1): 129-139.
- Ligo, L. L. 1984. *The Concept of Function in 20th Century Architectural Criticism*. Ann Arbor, Michigan: UMI Research Press.
- Lockton, D., Harrison, D., Stanton, N.A. (2010). The Design with Intent Method: a design tool for influencing user behaviour. *Applied Ergonomics*, 41(3): 382-392.
- Luttrell, A., Briñol P., and Petty, R.E. (2014). Mindful Versus Mindless Thinking and Persuasion, in Ie, A., Ngnoumen, C.T. and Langer, E. (eds.) *The Wiley Blackwell Handbook of Mindfulness*, vol 1., Wiley, Chichester, 258-278.
- Morgan, M. and Cotton, S.R. (2004). The Relationship between Internet Activities and Depressive Symptoms in a Sample of College Freshmen. *CyberPsychology & Behavior*, 6(2): 133-142.
- Niedderer, K. (2014). Mediating Mindful Social Interactions through Design, in Ie, A., Ngnoumen, C.T. and Langer, E. (eds.) *The Wiley Blackwell Handbook of Mindfulness*, vol 1., Wiley, Chichester, 345-366.
- Niedderer, K. (2007). 'Designing Mindful Interaction: The Category of the Performative Object', *Design Issues*, 23(1): 3-17.
- Niedderer, K. (2004). *Designing the Performative Object: A study in designing mindful interaction through artefacts*. (PhD thesis). Plymouth: Plymouth University.
- Norman, D.A. (2002). *The Design of Everyday Things*. Basic Books, US.
- Proper, K.I., Singh, A.S., van Mechelen, W., and Chinapaw, M.J.M. (2011). Sedentary Behaviors and Health Outcomes Among Adults: A Systematic Review of Prospective Studies. *American Journal of Preventative Medicine*, 40(2):174 –182.
- Smith, A. (1776[2010]). Of the Division of Labour. In G. Lees-Maffei and R. Houze (eds.) *The design history reader*. Oxford: Berg.
- Srivastava, L. (2005). Mobile phones and the evolution of social behaviour. *Behaviour & Information Technology*, 24 (2): 111-129.
- Staiano, A.E. and Calvert, S.L. (2011). Exergames for Physical Education Courses: Physical, Social, and Cognitive Benefits. *Child Development Perspectives*, 5(2): 93–98. doi:

10.1111/j.1750-8606.2011.00162.xStern, N.H. (2006) *The economics of climate change*. HM Treasury, UK

Stern, P.C. (2000). New environmental theories: toward a coherent theory of environmentally significant behavior, *Journal of Social Issues*, 56(3): 407-424.

Tromp, N., Hekkert, P. and Verbeek, P.P. (2011) Design for socially responsible behaviour: A classification of influence based on intended user experience, *Design Issues*, 27(3), 3-19.

Webster, C. (2007) Property rights, public space and urban design. *The Town Planning Review*, 78(1): 81-101.