Me against myself

Addressing personal dilemmas through design

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ME AGAINST MYSELF

Addressing personal dilemmas through design

Deger Ozkaramanli

ME AGAINST MYSELF
ADDRESSING PERSONAL DILEMMAS THROUGH DESIGN

Proefschrift

ter verkrijging van de graad van doctor
aan de Technische Universiteit Delft,
op gezag van de Rector Magnificus prof.ir. K.C.A.M. Luyben;
voorzitter van het College voor Promoties,
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door

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CONTENTS

"In this world there are only two tragedies: One is not getting what one wants, and the other is getting it."

- Oscar Wilde, Lady Windermere's Fan, Act 3

Preface

Our everyday life is saturated with dilemmas. Do I really want that extra piece of pie even though I am trying to maintain a slim waistline? Should I really pursue that job offer at the expense of being away from my family? Our dilemmas involve choices that we are emotional about, and thus, thinking about the consequences of these choices evokes mixed emotions. The complication here is that acting on one choice means forgoing, at least temporarily, the other. How can we resolve such emotional duality when both choices come with potential gains as well as losses?

This thesis is about the role of design in addressing emotional dilemmas. My fascination with dilemmas started when I was doing my graduation project at the Faculty of Industrial Design Engineering at Delft University of Technology (TU Delft). My intention in that project was to motivate habitual meat eaters to consume less red meat and more vegetables (or other meat alternatives). During user research, I found that people consumed red meat due to three main reasons: They thought it was convenient to prepare (e.g., "I want to cook and eat in a fast, easy, and manageable way"); they valued meat as a traditional food choice (e.g., "meat has always been the centerpiece of a home-made meal in my culture"); and they felt that they could be more creative when preparing meat (e.g., "I know how to prepare meat in a variety of original ways"). However, my research participants also reported feeling guilty about eating meat. This was because the majority of them cared about the environmental and ethical issues related to meat production and consumption. In light of these findings, I framed the design challenge as designing emotionally appealing food concepts to address the conflict between long-term goals and immediate desires (e.g., "I want to cook and eat in an environmentally responsible way" versus "I want to cook and eat in a fast, easy, and manageable way") (see Desmet & Ozkaramanli, 2012).

Addressing the conflict between long-term goals and immediate desires was an interesting challenge from the perspective of design creativity. Focusing on people's conflicting concerns (or dilemmas) made me question the effectiveness of existing product solutions, "how to tackle these emotional conflicts in more creative ways than offering, for example, *vegetarian sausages* as a meat alternative?" Such alternatives might contribute to eating in a socially responsible way, but they often harm other important goals such as eating in a

traditional way, or expressing creativity through food preparation. Instead, I decided to focus on personal dilemmas (e.g., "I want to consume food sustainably" versus "I want to maintain my traditional eating habits"). This approach made it possible to design food concepts that could simultaneously fulfill conflicting user concerns. In other words, during this project, I discovered that focusing on personal dilemmas was a valuable starting point for generating novel and emotionally evocative design ideas.

From a theoretical perspective, the relevance of dilemmas for user-centered design seemed to pose an attractive and ambitious challenge for design research. The potential of dilemmas to emotion-driven design had been mentioned in only a limited number of past studies (Desmet & Dijkhuis 2003; Desmet, 2010). However, it had not yet been systematically investigated. This knowledge gap inspired my PhD project. The Industrial Design Department at TU Delft, with its emphasis on tackling societal challenges through design, and with research groups dedicated to relevant fields such as Design for Emotion and Design for Subjective Wellbeing, created an excellent academic environment for this research to thrive in. In fact, Designing with Dilemmas is the first project that initiated the research portfolio of the Delft Institute of Positive Design. The timing of the project also reflects the changing role of design both in driving innovation processes to create economic value (e.g., Brown, 2009; Verganti, 2009) and in contributing to social welfare (e.g., Margolin & Margolin, 2002; Tromp, 2013).

Designing with dilemmas challenges the general view of users as consumers with coherent desires, and embraces conflicts in human nature as an opportunity for designing. Besides in a user-centered perspective, designing with dilemmas can also be used in designer-driven projects that aim to create social impact. Many societal issues, ranging from supporting healthy eating, promoting safe sex, to encouraging environmentally friendly behavior, can be approached from the perspective of dilemmas to understand human behavior and to intervene with it. My graduation project on sustainable eating is among these examples.

In the following chapters, you will find an analysis of dilemmas ranging from mundane, everyday dilemmas to dramatic, ideological ones. Moreover, you will discover that these dilemmas can inspire

design solutions that are innovative and noble in their intentions. As I continue to investigate the topic, dilemmas constantly draw my attention and stimulate me to think about how to deal with them, and most importantly, how to deal with them in designerly ways. I hope that this thesis will inspire you, as a user, to also notice some of your own dilemmas, and most importantly, to find the comfort in products and services that can help you manage your very many indecisive moments.

Deger Ozkaramanli.

References

Brown, T. (2009). *Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation.* New York, NY: HarperCollins Publishers.

Desmet, P. M. A. (2010). Three levels of product emotion. In C. Bouchard, A. Aussat, P. Levy, & T. Yamanaka (Eds.), *Proceedings of the International Conference on Kansei Engineering and Emotion Research* (pp.236–246). Paris: Arts et Métiers ParisTech.

Desmet, P. M. A., & Dijkhuis, E. A. (2003). Wheelchairs can be fun: A case of emotion-driven design. In *Proceedings of the International Conference on Designing Pleasurable Products and Interfaces* (pp. 22–27). New York, NY: ACM Press.

Margolin, V., & Margolin, S. (2002). A "social model" of design: Issues of practice and research. *Design Issues, 18*(4), 24–30.

Ozkaramanli, D., & Desmet, P. M. A. (2012). I knew I shouldn't, yet I did it again! Emotion-driven design as a means to subjective well-being. *International Journal of Design, 6*(1), 27–39.

Tromp, N. (2013). *Social Design.* Unpublished doctoral dissertation. Delft University of Technology, Delft, The Netherlands.

Verganti, R. (2009). *Design-Driven Innovation: Changing the Rules of Competition by Radically Innovating What Things Mean.* Harvard Business Press.

Terminology

In this section, the main terms and concepts used throughout this thesis are defined. Some of these terms, such as method and tool, are widely used in design research, and others, such as concern, conflict, and dilemma, have their roots in psychology research. The following definitions clarify how they have been used in this thesis.

Design space

The definition of design space proposed by Heape (2007) is adopted in this thesis: "the design process as the construction, exploration, and expansion of a conceptual space." In this thesis, this term is mostly used to refer to the conceptualization of ideas during the main design process.

Design aids

For ease of use, methods, tools, techniques, and strategies that are aimed to support design activities are referred to as *design aids*.
Tool: As suggested by Sanders, Brandt, and Binder (2010), design tools can be defined as tangible components that are used in design activities (e.g., cards, templates, or info-graphics).
Technique: A design technique is a description of how one or more tools can be implemented in design activities (e.g., card sorting or narrative creation).
Toolkit: Design tools and techniques can be combined in a toolkit to serve a specific purpose.
Strategy: We define design strategies as tangible prompts for mental exercises (e.g., illustrative product examples) that can support associative thinking and seeing alternative solutions in idea generation (Ozkaramanli & Desmet, 2016, Chapter 6 of this thesis).
Method: A design method is "goal oriented rationalization of designers' work in the form of a standardized work description." (Andreasen, 2015, p. 53)

Design approach

An approach can be defined as the mindset or ideology with which a method is executed. For instance, a participatory approach can be adopted in co-design where the belief is all people are creative (Sanders, Brandt, & Binder, 2010). Or a dilemma-driven approach can be adopted where the main assumption is designing with concern conflicts is inspiring for designers, and it ensures relevance for users. Here, the term 'approach' is used to refer to dilemma-driven design,

because it is a way of thinking, or a means, that can be adopted when designing, which can serve multiple goals depending on the intentions of the designer.

The term 'concern'

Desmet (2002), based on the work of Frijda (1986) and Lazarus (1991), used the term 'concern' to collectively refer to people's sensitivities (goals, values, aspirations, standards, dispositions) that serve as reference points when appraising whether their circumstances are beneficial or harmful for their wellbeing.

The term 'goal'

For reasons of simplicity, the well-defined construct 'goal' will be used as the main building block of dilemmas. Therefore, the terms 'concern' and 'goal' will be used interchangeably in the rest of this thesis. Following Austin and Vancouver (1996), goals can be defined as "internal representations of desired states where these states are defined as outcomes, events, or processes". All concerns relate to a finite number of higher-order, abstract human goals, such as belonging, physical well-being, safety and so on (Frijda, 2007; Ortony, Clore, & Collins, 1988), for which a number of well-known classifications exist in social and motivational psychology (Chulef, Read, & Walsh, 2001; Ford, 1992). For example, "I want to have dinner with my parents tonight" is a context-specific goal that corresponds to the universal goals of belonging and physical nurturance. Similarly, "I enjoy receiving compliments on my cooking skills" expresses the goal of resource acquisition at a concrete, dispositional level.

The term 'goal conflict'

Goal conflicts denote situations in which "a goal that a person wishes to accomplish interferes with the attainment of at least one other goal that the individual simultaneously wishes to accomplish" (Emmons, King, & Sheldon, 1993, p. 531; as cited in Michalak et al., 2004). Using the term "conflict" to define the tension between goals is in itself debatable as the word suggests something "wild and dramatic" that is hardly reconcilable (Berlyne, 1960, p. 10). However, the term and many of its synonyms (e.g., contradiction, ambivalence, duality, dissonance) were used in numerous psychology theories to represent contradicting tendencies within an individual. These theories span a

wide range of areas, from personality psychology to developmental psychology (Freud, 1929; Lewin, 1935; Festinger, 1957; Erikson, 1980). Because of this, instead of replacing the word conflict, we chose to stay loyal to the tradition in psychology; and focus our definition on the possible conflict between personal goals (or concerns). The terms 'goal conflict', 'concern conflict' and 'intrapersonal concern conflict' are used interchangeably in this thesis.

The term 'dilemma'

The literature on the psychology of dilemmas is fragmented across three main areas. Theories of motivation focus on the cognitive level and investigate what is defined above as goal conflicts (e.g., Austin & Vancouver, 1996). Emotion theories focus on the affective level and investigate mixed emotions involved in dilemmas, namely ambivalence (e.g., Newby-Clark, McGregor, & Zanna, 2002). Finally, judgment and decision-making theories focus on the behavioral level, and investigate mutually exclusive choices involved in dilemmas (e.g., Van Harreveld et al., 2009). For the benefit of designing, we adopt a holistic perspective on dilemmas, and define them as the experience of having to make a choice between two mutually exclusive alternatives, both of which touch upon their personal concerns, and the simultaneous fulfillment of which is challenging, if not impossible, to obtain or achieve. Because of this challenge, people experience both positive and negative emotions toward each alternative.

References

Andreasen, M. M., Hansen, T. C., & Cash, P. (2015). *Conceptual Design: Interpretation, Mindset, and Models.* Switzerland: Springer.

Austin, J. T., & Vancouver, J. B. (1996). Goal constructs in psychology: Structure, process, and content. *Psychological Bulletin, 120*(3), 338–375.

Berlyne, D. E. (1960). *Conflict, Arousal and Curiosity.* New York: McGraw-Hill.

Chulef, A. S., Read, S. J., & Walsh, D. A. (2001). A hierarchical taxonomy of human goals. *Motivation and Emotion, 25*(3), 191–232.

Desmet, P. M. A. (2002). *Designing Emotions.* Unpublished doctoral dissertation. Delft University of Technology, Delft, The Netherlands.

Erikson, E. H. (1980). *Identity and the Life Cycle.* New York: WW Norton & Company.

Festinger, L. (1957). *A Theory of Cognitive Dissonance.* Stanford, CA: Stanford University Press.

Ford, M. E. (1992). *Motivating Humans: Goals, Emotions, and Personal Agency Beliefs.* Newbury Park, CA: Sage publications.

Freud, S. (1929). *Civilization and Its Discontents.* London: Penguin Books.

Frijda, N. H. (1986). *The Emotions.* Cambridge, UK: Cambridge University Press.

Frijda, N. H. (2007). *The Laws of Emotions.* Mahwah, NJ: Lawrence Erlbaum.

Heape, C. R. A. (2002). *Designing Space.* Unpublished doctoral dissertation. University of Southern Denmark, Sønderborg, Denmark.

Lazarus, R. S. (1991). *Emotion and Adaptation.* Oxford, UK: Oxford University Press.

Lewin, K. (1935). *A Dynamic Theory of Personality.* New York: McGraw-Hill.

Michalak, J., Heidenreich, T., & Hoyer, J. (2004). Goal conflicts: Concepts, findings, and consequences for psychotherapy. In W. M. Cox, & E. Klinger (Eds.), *Handbook of Motivational Counseling: Concepts, Approaches, and Assessment,* (pp. 83–98). NJ, USA: John Wiley & Sons.

Newby-Clark, I. R., McGregor, I., & Zanna, M. P. (2002). Thinking and caring about cognitive inconsistency: When and for whom does attitudinal ambivalence feel uncomfortable? *Journal of Personality and Social Psychology, 82*(2), 157–166.

Ortony, A., Clore, G. L., & Collins, A. (1988). *The Cognitive Structure of Emotions.* Cambridge, UK: Cambridge University Press.

Ozkaramanli, D., & Desmet, P. M. A. (2016). Provocative design for unprovocative designers: Strategies for triggering personal dilemmas. In *Proceedings of DRS 2016, Design Research Society 50th Anniversary Conference.* Brighton, UK, 27-30 June.

Sanders, E. B. N., Brandt, E., & Binder, T. (2010). A framework for organizing the tools and techniques of participatory design. In *Proceedings of the 11th Biennial Participatory Design Conference: Participation :: Challenge,* Sydney, Australia, 29 November – 3 December, 2010 (pp. 195–198). ACM Press.

Van Harreveld, F., Rutjens, B. T., Rotteveel, M., Nordgren, L. F., & Van Der Pligt, J. (2009). Ambivalence and decisional conflict as a cause of psychological discomfort: Feeling tense before jumping off the fence. *Journal of Experimental Social Psychology, 45*(1), 167-173.

CHAPTER 1

Introduction

This chapter is partially based on the following journal article: Ozkaramanli, D., & Desmet, P.M.A. (2012). I knew I shouldn't, yet I did it again! Emotion-driven design as a means to subjective well-being. *International Journal of Design, 6*(1), 27–39.[1]

Our emotions sometimes seem to play tricks on us: We know we should not eat the bag of candy because it will make us feel bad. And yet we find ourselves opening the bag. While enjoying the taste, an inner voice tells us that we will pay for it later. Or we aim to create an original menu for a dinner party we are organizing, but fear of failure makes us doubt our cooking skills. We may think: why not use the good old roast chicken recipe instead? These and similar situations typically evoke mixed emotions: combinations of both pleasant and unpleasant emotions, such as satisfaction and remorse, or pride and regret. In this thesis, we explore how products can be designed with the intention to address these emotional dilemmas.

The emotions involved in dilemmas can be explained with the appraisal theory of emotions. There are several models in the design literature that attempt to explain the role of emotion in product design (Desmet, 2002; Jordan, 1999; Norman, 2004). Desmet (2002) used the appraisal approach as the basis for explaining how products elicit emotions through addressing one's concerns. In cognitive theories of emotion, an appraisal is defined as an automatic response to a situation that is relevant for one's wellbeing (Arnold, 1960). As it applies to design and emotion, an appraisal is "an automatic assessment of the effect of a product on one's well-being" (Demir, Desmet, & Hekkert, 2009, p. 1). For example, if one wants to be successful at work, a computer malfunctioning during an important presentation may

1 The first part of this chapter, until the section titled 'potential of dilemmas', has been adopted and edited from the 'introduction' section of the stated journal article.

generate anger towards the computer. Appraisal theory identifies concerns (e.g., professional success) as reference points in the process of emotion elicitation. The experience of positive or negative emotions towards a given situation depends on whether that situation fulfills or harms one's concern(s) (Frijda, 1986). In the case of dilemmas, the situation holds multiple choice alternatives. Each choice alternative is guided by a distinct personal concern, and because choosing one alternative implies forgoing the other, both positive and negative emotions (i.e., mixed emotions) are experienced towards each choice.[2] For instance, choosing to write a report for work on a Sunday afternoon (concern for professional success), instead of going to the beach with friends (concern for entertainment), may evoke pride for working hard, as well as guilt for letting down someone. Alternatively, choosing to go to the beach may evoke joy for having a good time with friends, as well as remorse for not using your free time to ensure professional success.

The appraisal approach to product emotions suggests that a potent way of designing for emotions is to design for concerns (Desmet, 2002). In studying the relationship between products and emotions, Desmet (2004, 2008), referring to the work of Ortony, Clore, and Collins (1988), differentiated among three distinct types of appraisals (usefulness, pleasantness, and rightfulness appraisals), which correspond to three concern types (goals, attitudes, and standards, respectively). These were then linked to three levels of emotional appeal that involve identity-focused, activity-focused, and product-focused concerns (Desmet, 2008). Both of these frameworks emphasize the central role of concerns in designing for emotion. Design for emotion also provides a means to design for subjective wellbeing. Frijda (2007) argues that emotions can surface goals when a specific concern obtains a high priority in the hierarchical concern structure of a person. Such concerns are often long-term goals with high emotional value, such as wanting to get a promotion or wanting to be a good mother. During goal pursuit, expectation of an emotional

2 These emotions are evoked by the anticipated consequences of each choice alternative, and in that sense, they can be defined as anticipated or virtual emotions (Perugini & Bagozzi, 2001; Frijda, 2007). In addition, there is much debate about whether mixed emotions are experienced simultaneously, by quickly shifting attention from one way of viewing the situation to another, or in a layered fashion through primary and secondary appraisals (Lazarus, 1991; Pugmire, 1996). It seems reasonable to argue that mixed emotions are experienced sequentially in dilemmas. That is, by shifting attention from the consequences of choosing one alternative to those of choosing the other.

outcome motivates action for goal achievement fueled by "intention, anticipation, and reflective control" to reach a desired end-state (Frijda, 2007, p. 194). Given that the desired end-state aligns with one's true values and intrinsic interests, fulfillment of long-term goals can enhance subjective wellbeing (Brunstein, 1993, Desmet & Pohlmeyer, 2013). As a result, both design for emotion and design for subjective wellbeing require transformation of users' concerns into novel and emotionally evocative products.

Having such a prominent role in emotion-driven design, concerns can (and often do) conflict with each other. People often pursue many goals at the same time, which can interfere with each other (Riediger & Freund, 2004). Concern conflicts occur when pursuing one goal (e.g., waking up early to prepare for a work meeting) interferes with the fulfillment of another goal (e.g., getting enough sleep). These concern conflicts often manifest themselves as dilemmas. In fact, a recent study showed that half the time people are awake, they experience a desire and that nearly half of those desires conflict with other goals (Hoffman, Baumeister, Förster, & Vohs, 2012). People's dilemmas may seem to pose a challenge when designing for emotion: which concern should one target in the design process?

This thesis proposes that dilemmas are an opportunity for emotion-driven design when the design focuses on the conflict among concerns instead of on either one of the concerns. Any unfulfilled user concern can be an inspiring starting point for creating emotionally evocative designs. Imagine your alarm clock ringing in the morning; you want to start your workday as early as possible, but it is tough to get out of a warm and comfortable bed. In this example, there are designs that can contribute to comfort and there are designs that can help people to be punctual or productive. However, designing for concerns in isolation may result in designs that address one concern situated in a specific design context, while ignoring, or even worse, violating another concern that is relevant for the same context. As a result, such designs evoke both pleasant and unpleasant user emotions. Imagine waking up to the sound of a twin-bell alarm clock: This terrifying alarm sound is effective in getting you out of bed, but it most probably also ruins your chances for starting the day with a good mood. In other words, this product performs well when addressing the concern for waking up at a planned time, while it harms the concern for comfort, which is equally important in that context. Here, we propose that focusing

on the conflict between concerns, instead of on specific concerns in isolation, can lead to novel and emotionally evocative design ideas. For instance, the snoozing function of an alarm clock can resolve the conflict between punctuality and comfort, at least temporarily.

Potential of dilemmas

Designing with dilemmas is a way of understanding and responding to human psyche, which strictly considers the intrapersonal concern conflicts as a starting point for enriching the effect of the proposed design solution on people (or users). With the exception of design approaches that aim to raise awareness rather than to solve problems (e.g., critical design), design is traditionally considered to be a problem solving discipline, and designers to be creative problem solvers. From a user-centered design perspective, problems involve an unmet user need, which is translated into a task for the designer (Andreasen, 2015). Here, the way design problems are formulated determines the relevance of the solution. For instance, if lack of social contact is considered to be a problem in a work environment, building a new communal room or a coffee corner may be fitting solutions. Alternatively, one can frame the problem differently by asking: "why is social contact a problem?" The possible responses to this question (e.g., concern for efficiency) are likely to produce radically different solutions compared to building a new communal room. In this thesis, we propose that framing design problems as dilemmas enables pinpointing and addressing the actual causes of problems. For instance, the problem in the previous example can be framed in terms of a personal dilemma: "I want to socialize with colleagues over lunch" *(concern for belonging),* but "I also want to work during lunchtime to manage my workload" *(concern for competence)*. In short, the starting point in dilemma-driven design is not a tangible human need as it often is in functional product design. Instead, this approach tackles human needs on a higher level of human psyche.

In addition, designing with dilemmas can be used to address any design problem, regardless of its complexity or focus. With a shifting focus in design from problems of users to more pervasive problems of people and societies, dealing with complexity in systematic ways has become an increasingly relevant topic for design research (Margolin & Margolin, 2002; Tromp, 2013). Besides underlying simple, everyday problems of users (e.g., to wear either comfortable, yet unstylish, or painful, yet elegant shoes to an important work meeting), dilemmas

also underlie complex, pervasive problems of societies. Many social problems, such as obesity, teen pregnancy, or educational underachievement, revolve around people's failure to control or alter their behavioral choices (Baumeister & Heatherton, 2006). People's dilemmas can contribute to this failure, because they suggest incompatible behaviors (e.g., health vs. indulgence) (Baumeister & Heatherton, 2006). Therefore, identifying and dealing with the dilemmas that underlie behavior can be a means to framing real-life problems that cause social and individual suffering.

Finally, there is evidence in psychology literature that supporting people in dealing with their dilemmas has implications for everyday experiences as well as subjective wellbeing. Dilemmas prevail in everyday life, and thus, their management depletes self-regulatory resources (Hoffman, Baumeister, Förster, & Vohs, 2012). In addition, being related to decision-making processes, experiencing dilemmas may have a negative influence on the satisfaction derived from daily choices (phenomenon called paradox of choice, see Schwartz, 2004). From the perspective of subjective wellbeing, such conflicts have been associated with high levels of negative affect, depression, neuroticism, and psychosomatic complaints (Emmons & King, 1988; see also Riediger & Freund, 2004; Schmuck & Sheldon, 2001); and it has been shown to have a moderating role in occupational burnout (Hyvönen et al., 2015).

Current use of dilemmas

There has been an increasing interest in solving conflicting design problems, which indicates a need for understanding the relevance of personal dilemmas for design. This thesis addresses this need through focusing on supporting designers in explicitly and methodically tackling personal dilemmas (i.e., intrapersonal concern conflicts). From the perspective of design creativity, some studies have suggested that conflicts between user requirements can trigger creativity in the ideation process as they stimulate the designer to think about solutions that resolve the conflict and restore balance (Benack, Basseches, & Swan, 1989; Cross, 2003). Most notably, Theory of Inventive Problem Solving (TRIZ) (Mann, 2001) focuses on identifying and resolving conflicting technical requirements in a design brief. From the perspective of user-centered design, Hekkert & van Dijk (2011) stated that conflicts between contextual factors (i.e., context-related observations, theories, thoughts and so on) are good starting points for

mapping a future design context when using Vision in Product Design (ViP) method. Building on ViP, Tromp (2013) focused on conflicts between individual and societal needs (i.e., social dilemmas) as a starting point to design for behavior change. Although these studies indicate that conflicts (whether technical or people-oriented) can be a starting point for design activities, none of them specifically focus on the experience of *personal dilemmas* and its *methodical integration* in the design process.

Aim of this thesis

The richness of the dilemma phenomenon and the wide variety of dilemmas people experience offer an unexplored yet promising space for the conceptual phases of design. Dilemma is a rich psychological phenomenon that involves cognitive, emotional, and behavioral ingredients. An understanding of this richness can provide inspiring input for design activities. In addition, people's dilemmas are extremely varied, ranging from very practical ones that complicate everyday decision making (e.g., elegance versus comfort) to very fundamental ones that deeply affect subjective wellbeing (e.g., career versus family). Although design can often resolve these dilemmas (e.g., a pair of shoes that look both elegant and feel comfortable), the variety of dilemmas people experience suggests that dilemmas can be handled in ways that go beyond the obvious intention to resolve them.

The psychological literature on the nature of dilemmas offers a promising ground for exploring the design relevance of dilemmas; however, this literature is fragmented into different fields such as motivational psychology, developmental psychology, and emotion theory. Therefore, studying the adoption of dilemmas in user-centered design is a research topic that requires multi-disciplinary expertise. Mainly, one needs to bridge theories and principles in psychology and in design to support the understanding of the phenomenon and its adoption in the design process. Moreover, this learning has to be transferred to the target audience, design practitioners, in a way that is actionable (i.e., simple, inspiring, and engaging) in design activities. This thesis addresses both of these challenges. With this in mind, **the main aim of this thesis is to (a) increase our understanding of how personal dilemmas can inform user-centered design, and to (b) develop design aids that support designers in integrating personal dilemmas in their design processes.**

This overall aim translates to three sub-aims and the following research questions (RQs):

Sub-aim 1

Understanding the role of design in addressing personal dilemmas:

- (RQ1) What categories exist within the domain of dilemma-addressing product design?

Sub-aim 2

Supporting designers in identifying relevant and inspiring personal dilemmas:

- (RQ2) What are suitable criteria for selecting relevant and inspiring (i.e., design-worthy) dilemmas?
- (RQ3) What are suitable criteria for framing concerns in a dilemma?

Sub-aim 3

In response to the first research question, three categories of dilemma-addressing products have been identified, which indicate that designers can respond to personal dilemmas using three design directions, namely *resolving, moderating,* and *triggering dilemmas.* Therefore, the third sub-aim is to develop strategies that can support implementing these design directions in generating ideas to address personal dilemmas.

- (RQ4) What design strategies can facilitate ideation when resolving dilemmas?
- (RQ5) What design strategies can facilitate ideation when addressing self-control dilemmas?
- (RQ6) What design strategies can facilitate ideation when triggering dilemmas?
- (RQ7) What are the opportunities and challenges involved in designing with dilemmas?

The main outcome of the project is the elaboration of three main directions with which design can address dilemmas. These are *resolving dilemmas, moderating dilemmas,* and *triggering dilemmas.* Each of these directions is supported by design strategies that can facilitate their adoption in ideation. It may be a challenge to select a relevant and inspiring dilemma to target in ideation because people may experience many dilemmas in a given design context. To address this challenge, a set of criteria is suggested that can be used to select a dilemma that is relevant for the design brief and inspiring for the designer to work with. Finally, to make the findings of this thesis actionable by design practitioners, the main findings are supported by a complementary

booklet (Book of Dilemmas for Designers) and a toolkit (Dilemma Co-Exploration Toolkit). The Book of Dilemmas for Designers summarizes the main outcomes of this thesis in a visual and engaging way with the goal of inspiring design practitioners to adopt dilemmas in their design processes. The toolkit includes two different card-sets that can be used to collaboratively formulate and discuss hypothetical dilemmas in a design team at the early stages of framing the design problem.

Research approach

The studies presented in this thesis use a number of research methods, some of which originate from social sciences (e.g., in-depth interviewing, observations) while others are rooted in design research (e.g., analyzing existing products, idea generation workshops). Table 1.1 summarizes the research questions, studies, and main outcomes of each chapter.

In two chapters (Chapter 2 and Chapter 6), an analysis of existing products is reported in order to define the role of products in addressing people's dilemmas (Study 1 and Study 6). For this, product examples with detailed descriptions were used, indicating which user concerns the design team wanted to address. Where possible, the designers of these products were contacted for detailed explanations. In Chapter 5, a phenomenological study (Study 5) is reported that was conducted to understand the psychology of dilemmas.[3] Chapters 3, 4, 6 and 7 employed short-term and long-term design cases in the form of design workshops and case studies (respectively) conducted with novice designers (Study 2, 3, 4, 6, and 7). These studies created the opportunity to implement designing with dilemmas in various design domains such as sustainability, social play, and mental health. The reflections of designers who took part in these projects combined with observations and field notes shaped the findings of these studies.

3 At least two approaches can be adopted to understand the psychology of dilemmas: a phenomenological or an external approach. Using an external perspective asks for evaluating concerns and concern conflicts as an external observer or according to existing standards such as observable behaviors (Austin & Vancouver, 1994). In contrast to an external perspective, a phenomenological approach surfaces people's individual perception of their experiences (Austin & Vancouver, 1994).

Table 1.1. Overview of research questions, research methods and main outcomes for each chapter

Chapter	Research question	Studies	Main outcome (MO)
2	RQ1: What categories exist within the domain of dilemma-addressing product design?	Study 1: Analysis of 109 existing products that address conflicting user concerns	Three design directions for addressing dilemmas (i.e., resolving, moderating, and triggering dilemmas)
3	RQ2: What are suitable criteria for selecting relevant and inspiring (i.e., design-worthy) dilemmas?	Study 2: Comparative analysis of four design cases	Qualities of design-worthy dilemmas
4	RQ3: What are suitable criteria for framing concerns in a dilemma? RQ4: What design strategies can facilitate ideation when resolving dilemmas?	Study 3&4: An industry project (study 3), followed by a design brief completed by sixty novice designers (study 4)	Three levels of concern framing Four design strategies for resolving dilemmas
5	RQ5: What design strategies can facilitate ideation when addressing self-control dilemmas?	Study 5: Phenomenological study, followed by theory-driven formulation of design strategies	Framework of dilemmas and three design strategies for addressing self-control dilemmas
6	RQ6: What design strategies can facilitate ideation when triggering dilemmas?	Study 6: Analysis of existing, dilemma-triggering products, followed by expert evaluation and design workshops with fifteen novice designers	Preliminary design strategies for triggering dilemmas
7	RQ7: What are the opportunities and challenges involved in designing with dilemmas?	Study 7: Reflections of twenty-five novice designers across three consecutive design workshops	Three main activities for designing with dilemmas and recommendations on five challenges of using this approach

Thesis structure

This thesis is organized in three main parts: Understanding dilemmas (Part A), designing with dilemmas (Part B), and implementation and discussion (Part C). Each chapter addresses at least one of the three main activities necessary for incorporating dilemmas into the design process (Figure 1.1). These activities are *Discovery, Definition,* and *Application. Discovery* involves identifying (or 'capturing') dilemmas relevant for a given design brief. It results in a broad overview of users' dilemmas. *Definition* starts with analyzing each identified dilemma. During analysis, conflicting concern statements are formulated at various abstraction levels until an inspiring formulation is found (framing dilemmas). Analysis and framing helps selecting a design-worthy dilemma (target dilemma). *Application*, the last activity discussed in this thesis, involves generating design ideas to address the selected target dilemma.

Note that not all studies are chronologically reported in this thesis. When certain chapters discuss insights, frameworks, or tools that are based on studies reported in another chapter in the thesis, this is indicated with a special footnote that is in blue.

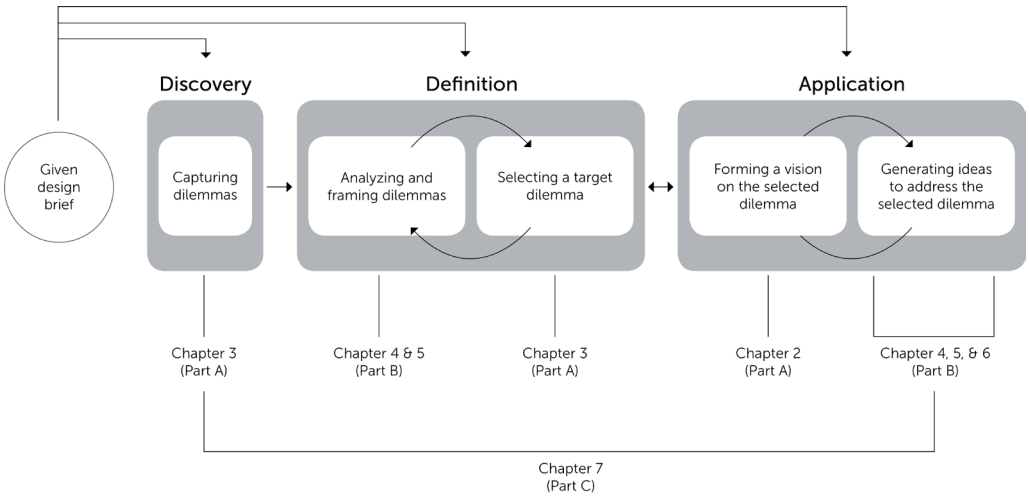


Figure 1.1. Outline of this thesis based on the main activities of designing with dilemmas

Part A – Understanding dilemmas

Part A provides a general understanding of the role of design in addressing dilemmas. The product exploration study in **Chapter 2** demonstrates three different ways design can address dilemmas: resolving, moderating, and triggering dilemmas. This chapter can be considered as a meta-chapter for the thesis as it briefly discusses the principles and theories that underlie the chapters in Part B. Therefore, for a quick overview of the thesis, we recommend reading Chapter 2 as it provides a theoretical understanding of how design can address dilemmas illustrated with examples. **Chapter 3** focuses on the challenge of selecting a design-worthy dilemma among many dilemmas that people may experience in a given design context. This chapter is based on four dilemma-driven case studies, which also demonstrate the main activities involved in designing with dilemmas. The illustrative project examples in the second chapter can complement the theoretical understanding of designing with dilemmas provided in the first chapter. Therefore, reading Chapter 2 and Chapter 3 in combination can provide a compact introduction to dilemmas as a design-relevant phenomenon.

Part B – Designing with dilemmas

Part B is dedicated to elaborating on distinct ways design can address dilemmas. These roles (also referred to as design directions) are *resolving dilemmas* (Chapter 4), *moderating dilemmas* (Chapter 5), and *triggering dilemmas* (Chapter 6). These chapters share the main goal of proposing design strategies that can support realizing the proposed design directions in idea generation. In addition, each chapter offers insights and outcomes specific to the theoretical context they discuss. Specifically, **Chapter 4** discusses the role of thinking in terms of abstract and concrete concerns when resolving dilemmas, and suggests four design strategies used when resolving dilemmas. This chapter may be particularly interesting for those who wish to understand how users' conflicts can be reframed in ways to inspire innovative product ideas, both when creating new product concepts and when redesigning an existing product. **Chapter 5** focuses on a specific type of dilemma, namely self-control dilemmas, and suggests six strategies for motivating long-term goals or for demotivating short-term desires. In addition, this chapter includes a phenomenological study that resulted in a framework of dilemmas, which is used in the rest of the thesis to explain the experience of dilemmas. This chapter may be a good starting point for readers who are particularly interested in

how insights into the psychology of dilemmas can inspire design for behavior change and design for subjective wellbeing. Finally, **Chapter 6** explores the design direction 'triggering dilemmas', which can be a means to designing for provocation. Thus, reading Chapter 6 can be particularly intriguing for those who are interested in demystifying the non-methodical nature of provocative design.

Part C – Implementation and discussion

Part C, the final part of the thesis, integrates and discusses the findings from the previous chapters. In **Chapter 7**, the methods, tools, and design strategies introduced in previous chapters are integrated into three consecutive design activities involved in designing with dilemmas. These activities are discovery (identifying dilemmas), definition (selecting a design-worthy dilemma), and application (generating ideas to address the selected dilemma), which correspond to the conceptual phase of designing. These activities are then implemented in a design case, through which challenges and opportunities of designing with dilemmas are identified. **Chapter 8** discusses the main conclusions of this thesis together with potential implications of the findings, limitations, and opportunities for future research.

References

Andreasen, M. M., Hansen, T. C., & Cash, P. (2015). *Conceptual Design: Interpretation, Mindset, and Models.* Switzerland: Springer.

Arnold, M. B. (1960). *Emotion and Personality (Vol. 1): Psychological Aspects.* New York, NY: Colombia University Press.

Austin, J. T., & Vancouver, J. B. (1996). Goal constructs in psychology: Structure, process, and content. *Psychological Bulletin, 120*(3), 338–375.

Baumeister, R. F., & Heatherton, T. F. (1996). Self-regulation failure: An overview. *Psychological Inquiry, 7*(1), 1–15.

Benack, S., Basseches, M., & Swan, T. (1989). Dialectical thinking and adult creativity. In J. A. Glover, R. R. Ronning, and C. R. Reynolds (Eds.), *Handbook of Creativity* (pp. 199-208). New York, USA: Springer US.

Brunstein, J. C. (1993). Personal goals and subjective well-being: A longitudinal study. *Journal of Personality and Social Psychology, 65*(5), 1061–1070.

Cross, N. (2003). The expertise of exceptional designers. *Expertise in Design, Creativity and Cognition Press,* University of Technology, Sydney, Australia, 23-35.

Demir, E., Desmet, P. M. A., & Hekkert, P. (2009). Appraisal patterns of emotions in human-product interaction. *International Journal of Design, 3*(2), 41–51.

Desmet, P. M. A. (2002). *Designing Emotions.* Unpublished doctoral dissertation. Delft University of Technology, Delft, The Netherlands.

Desmet, P. M. A. (2004). From disgust to desire: How products elicit emotions. In D. C. McDonagh, P. Hekkert, J. van Erp, & D. Gyi (Eds.), *Design and Emotion: The Experience of Everyday Things* (pp. 8–12). London, UK: Taylor & Francis.

Desmet, P. M. A. (2008). *Product emotion.* In H. N. J. Schifferstein & P. Hekkert (Eds.), Product Experience (pp. 379-397). Amsterdam, The Netherlands: Elsevier.

Desmet, P. M. A., & Pohlmeyer, A. E. (2013). Positive design: An introduction to design for subjective well-being. *International Journal of Design, 7*(3), 5–19.

Emmons, R. A., & King, L. A. (1988). Conflicts among personal strivings: Immediate and long-term implications for psychological and physical well-being. *Journal of Personality and Social Psychology, 54*(6), 1040–1048.

Frijda, N. H. (1986). *The Emotions.* Cambridge, UK: Cambridge University Press.

Frijda, N. H. (2007). *The Laws of Emotions.* Mahwah, NJ: Lawrence Erlbaum.

Hekkert, P., & van Dijk, M. (2011). *ViP-Vision in Design: A Guidebook for Innovators.* Amsterdam: BIS Publishers.

Hofmann, W., Baumeister, R. F., Förster, G., & Vohs, K. D. (2012). Everyday temptations: An experience sampling study of desire, conflict, and self-control. Journal of Personality and Social Psychology, 102(6), 1318–1336.

Hyvönen, K., Rantanen, J., Huhtala, M., Wiese, B. S., Tolvanen, A., & Feldt, T. (2015). Conflicting personal goals: a risk to occupational well-being? *Journal of Managerial Psychology, 30*(8), 1034–1048.

Jordan, P. W. (2000). *Designing Pleasurable Products.* Oxon, UK: Taylor & Francis.

Lazarus, R. S. (1991). *Emotion and Adaptation.* Oxford, UK: Oxford University Press.

Mann, D. (2001). TRIZ: The Theory of Inventive Problem Solving. *Creativity and Innovation Management, 10*(2), 123–125.

Margolin, V., & Margolin, S. (2002). A "social model" of design: Issues of practice and research. *Design Issues, 18*(4), 24–30.

Norman, D. A. (2004). *Emotional Design: Why We Love (or Hate) Everyday Things.* New York, NY: Basic Books.

Ortony, A., Clore, G. L., & Collins, A. (1988). *The Cognitive Structure of Emotions.* Cambridge, UK: Cambridge University Press.

Perugini, M., & Bagozzi, R. P. (2001). The role of desires and anticipated emotions in goal-directed behaviors: Broadening and deepening the theory of planned behavior. *British Journal of Social Psychology, 40*(1), 79–98.

Pugmire, D. (1996). Conflicting emotions and the indivisible heart. *Philosophy, 71*(275), 27–40.

Riediger, M., & Freund, A. M. (2004). Interference and facilitation among personal goals: Differential associations with subjective well-being and persistent goal pursuit. *Personality and Social Psychology Bulletin, 30*(12), 1511–1523.

Schmuck, P., & Sheldon, K. M. (Eds.). (2001). *Life Goals and Well-being: Towards a Positive Psychology of Human Striving.* Seattle, WA: Hogrefe & Huber.

Schwartz, B. (2004). *Paradox of Choice: Why More is Less.* New York, NY: HarperCollins Publishers.

Tromp, N. (2013). *Social Design.* Unpublished doctoral dissertation. Delft University of Technology, Delft, The Netherlands.

PART A

Understanding Dilemmas

Part A of this thesis consists of two chapters. Chapter 2 can be considered as a meta-chapter outlining some of the main findings of this thesis. It involves an analysis of 109 existing products (Study 1) to address the first research question in Table 1.1, which is *what categories exist within the domain of dilemma-addressing product design?* In addition, this chapter introduces a definition for dilemmas in the context of user-centered design and three directions with which designers can address personal dilemmas. These directions are resolving, moderating, and triggering dilemmas. The definitions and the directions discussed in this chapter will be revisited and elaborated in Part B of this thesis.

The second chapter in Part A, Chapter 3, touches upon one of the main challenges of designing with dilemmas, that is, to identify a relevant and inspiring dilemma when defining an appropriate design problem. The proposition in this chapter is that some dilemmas work better as input for ideation than other dilemmas; that is, they are more 'design-worthy'. In line with this, Chapter 3 addresses the second research question in Table 1.1, which is *what are suitable criteria for selecting relevant and inspiring (i.e., design-worthy) dilemmas?* Based on comparative analysis of four dilemma-driven design cases (Study 2), seven key qualities of design-worthy dilemmas were identified. These qualities were clustered in three categories: (1) relevance for target users, (2) potential to inspire design ideas, and (3) meaningful formulation of conflicting concerns.

"Thinking begins in what may fairly enough be called a forked-road situation, a situation which is ambiguous, which presents a dilemma, which proposes alternatives. (...) In the suspense of uncertainty, we metaphorically climb a tree; we try to find some standpoint from which we may survey additional facts and, getting a more commanding view of the situation, may decide how the facts stand related to one another."

- John Dewey, How We Think, p. 11

CHAPTER 2

Beyond resolving dilemmas: Three design directions for addressing intrapersonal concern conflicts

This chapter is entirely based on the following journal article: Ozkaramanli, D., Desmet, P.M.A., & Özcan, E. (2016). Beyond Resolving Dilemmas: Three Design Directions for Addressing Intrapersonal Concern Conflicts. *Design Issues, 32*(3), 78-91.[1]

Abstract

A potent way of designing for emotion is to design for concerns. However, people have multiple, and often, conflicting concerns. Such conflicts create emotional dilemmas: One may need to spend a Sunday afternoon working to meet a deadline, and at the same time, wish to attend a birthday party. In this paper, we consider conflicting concerns as a design opportunity: Any of the concerns can be a starting point for designing products or services that appeal to the users. However, we propose that the tension created by the conflict can be more inspiring than the involved concerns in isolation. In this paper, we present an analysis of 109 existing products through which we identify three directions these products seem to use to address users' dilemmas. These directions are resolving dilemmas, moderating dilemmas, and triggering dilemmas. We discuss the similarities and differences between these directions and their potential contribution to design fields such as designing for emotions and designing for subjective wellbeing.

Keywords: design for emotion; conflicting concerns; design with dilemmas; user-centered design

1 This chapter is entirely based on the stated journal article without any modifications to its content. The style and formatting of the article have been modified to match the visual style of the thesis, and references to other thesis chapters have been added where appropriate.

Introduction

Designing products and services that fulfill people's unmet goals, needs, and preferences is a key element of user-centered design. Desmet used the term "concern" to collectively refer to these goals, needs, and preferences and, based on Arnold's appraisal theory of emotions, stated that creating products that touch on people's concerns is a potent way of designing for emotion (Arnold, 1960; Desmet, 2002). People's concerns also play an important role in designing for subjective well-being: Designing to fulfill personal (long- or short-term) goals and aspirations (designing for personal significance) is one of the main constituents of the positive design framework (Desmet & Pohlmeyer, 2013).

However, people have many, often conflicting concerns related to their everyday activities. For example, a person might want to maintain a slim figure and, at the same time, enjoy the pleasures of eating chocolate, or another might need to spend a Sunday afternoon working to meet an urgent deadline and, at the same time, want to attend a birthday party. In the context of designing, resolving such conflicts (which might arguably lead to less stress and anxiety and therefore to an increase in well-being) might be considered a challenge, given that they imply a choice between what appear to be mutually exclusive alternatives. In this paper, we consider conflicting concerns as an opportunity rather than a threat, and examine how the dynamic created by experiencing these polarities—more than either one of the poles—can inspire fruitful user-centered design activities. In line with this proposition, the goal of this paper is to introduce three different opportunities to design for conflicting concerns, with implications particularly for the fields of design for emotion and design for subjective well-being.

People's conflicting concerns often manifest themselves as dilemmas. One product that addresses an everyday dilemma for women is the Tanya Heath Paris (THP) shoe (see Figure 2.1)—a high-heeled shoe that turns into a low-heeled version by switching to a different type of heel. The shoe was designed with the intention of resolving the dilemma between elegance and comfort. Here, a design solution focusing only on the concern for elegance would violate the concern for comfort. Similarly, designing only to address the concern for comfort would ostensibly violate the concern for elegance. As a result, neither of the resulting designs would be emotionally

satisfying because they would evoke both pleasant and unpleasant user experiences. To resolve this emotional duality, the designer of Tanya Heath shoes seems to have focused on simultaneously fulfilling the conflicting concerns, instead of focusing on either concern in isolation.[2]

Figure 2.1. Tanya Heath Shoes, Paris (THP Shoes). A multi-height high-heeled shoe that turns into its low-heeled version with a simple click that allows you to remove and change the design of the heel (photo: Courtesy of THP Shoes)

The THP shoes in Figure 2.1 are an example of how conflicting concerns are often addressed with design—that is, by redesigning a product in a way that resolves the concern conflict. However, the landscape of designing with dilemmas extends beyond resolving dilemmas. Consider the notorious dilemma between health and indulgence. Although food products, such as low-fat ice cream, aim for resolution, the products in Figure 2.2 illustrate that this dilemma can be addressed in at least two additional ways: by moderating (e.g., "KitchenSafe") and by triggering (e.g., "Dilemma") the dilemma. KitchenSafe (see Figure 2.2a) has a time-controlled lock mechanism that helps people to stay away from tempting snacks (e.g., candy) for a desired amount of time, and Dilemma (see Figure 2.2b) is a table piece that can be used as either a fruit bowl or a cake plate, acknowledging the health vs. enjoyment dilemma.

2 In fact, THP shoes addresses conflicting concerns *alternately* instead of *simultaneously*: it offers both solutions in one product, where the user can choose which concern is to prevail. In Chapter 3, this argument will become clearer as 'designing flexibility into the product', which often involves alternating between two solutions based on the situation, is one of the proposed design strategies to resolve dilemmas.

People's dilemmas are extremely varied, ranging from very practical ones that subtly influence subjective well-being (e.g., elegance vs. comfort) to essential ones that fundamentally affect subjective well-being (e.g., career vs. family). The wide variety of dilemmas people experience offers an interesting space to explore dilemma-focused design opportunities that go beyond resolving the dilemmas. To explore the three distinct design directions that specifically address dilemmas, we first introduce a definition of dilemmas. Next, we present an analysis of 109 existing products through which we identify the three directions these products seem to use to address users' dilemmas. Finally, we discuss the similarities and differences between these directions and their potential contribution to design fields, such as designing for emotions and designing for subjective well-being.

Figure 2.2a. KitchenSafe by David Krippendorf. A kitchen appliance with a time-controlled lock mechanism, which, for a desired amount of time, prevents access to tempting food (e.g., candy) (photo: Courtesy of KitchenSafe)

Figure 2.2b. Dilemma by Dean Brown designed for Fabrica. An uncertain table piece that can be used as fruit bowl or a cake plate. It acknowledges a personal dilemma: to eat healthily or to indulge. Without being judgmental, it presents two alternative ways to enjoy food (photo: Shek Po Kwan, 2014. Courtesy of the designer)

Defining dilemmas

Intrapersonal conflict, or contradicting tendencies within an individual, is a well-studied psychological phenomenon that represents an important aspect of the variety and complexity of human experience. To illustrate, the concept appeared in the writings of Freud to emphasize the hidden conflicts between the conscious and the unconscious mind (Freud, 1929). In addition, it was used by Lewin (1935) to describe basic motivational poles, or motivational conflicts (i.e., approach–approach, approach–withdraw, withdraw–withdraw) and by Erikson (1980) to illustrate the tensions within the stages of psychosocial development (e.g., initiative vs. guilt, at play-age). The Cognitive Dissonance Theory developed by Festinger (1957) focuses on how people achieve psychological balance despite inconsistent (or conflicting) thoughts or attitudes. Meanwhile, Piaget's Dynamic Disequilibrium Theory (1952) proposes that discrepancy (or conflict) between what children already know and what they discover in their environment is a prerequisite for cognitive development. These theories span a wide range of areas, from personality psychology to developmental psychology, which indicates that intrapersonal conflict is a multi-faceted experience that can engage multiple psychological constructs.

For the purpose of user-centered design, we define the key feature of dilemmas as the realization that two options exist that cannot be exercised simultaneously. We approach dilemmas from a phenomenological perspective, considering them to be experiences with three main constituents: (1) mutually exclusive choices at the behavioral level, (2) conflicting concerns at the cognitive level, and (3) mixed emotions at the affective level (Ozkaramanli, Özcan, & Desmet, 2017; Chapter 5 of this thesis). The articulation of these three ingredients enables us to provide a more elaborate definition of dilemmas: People experience a dilemma when they are faced with two mutually exclusive choices, both of which touch upon their personal concerns, and the simultaneous fulfillment of both choices is challenging, if not impossible, to obtain or achieve. Because of this challenge, people experience both positive and negative emotions toward each alternative. This definition is in line with the literature on goal-directed behavior, which suggests that goals can only be properly understood when they are studied in relation to other goals, and also by taking into account the cognitive, behavioral, and affective responses organized in goal pursuit (Austin & Vancouver, 1996).

These three constituent parts serve to illustrate the depth of experience inherent in dilemmas and can thus help designers to unravel them. Consider the following scenario, which is also illustrated in Figure 2.3: You are at a restaurant with friends; you have just finished your dinner, and the waiter asks if you would like to have some dessert. You are very full after your meal; however, the idea of having something sweet and indulgent sounds very tempting. Dilemmas always involve choices between appealing alternatives: Each choice leads to potential "gain" and "loss"— for example, will you indulge in the dessert (gain) at the cost of feeling gluttonous (loss)? Or will you control your urges (gain) at the cost of prolonging an enjoyable dinner experience (loss)?[3]

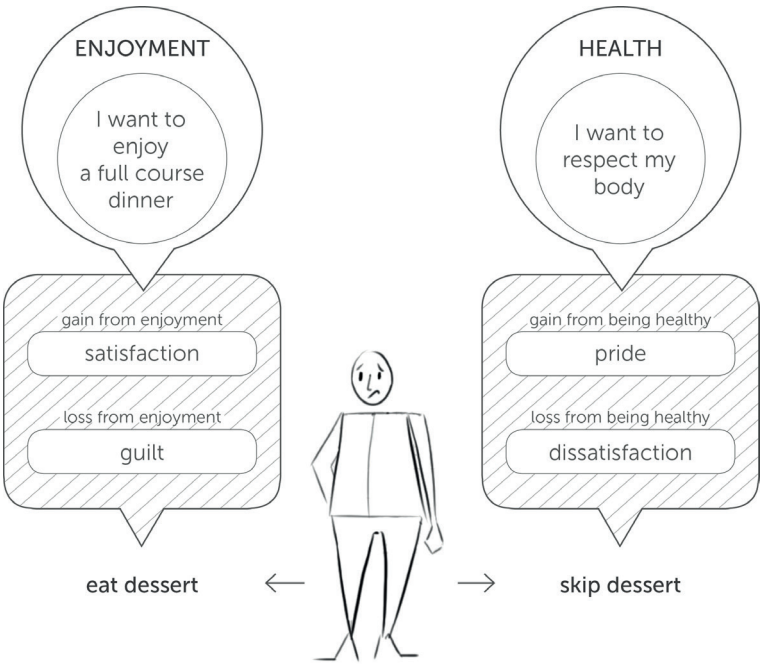


Figure 2.3. Model of dilemmas for designers illustrating the three main ingredients of dilemmas (mutually exclusive choices, conflicting concerns and mixed emotions

These prospective gains and losses are associated with the potential harm or fulfillment of personal concerns. In this case, the concern of fully enjoying a dinner out conflicts with the concern of controlling what may be an overly indulgent appetite. As personal concerns are weighed against one another, this moment of hesitation results in mixed emotions. If you choose to have dessert, you might feel

3 The development of this model is based on the phenomenological study reported in Chapter 5. Therefore, for a more detailed understanding of this model, please refer to Chapter 5. Also note that, in all subsequent chapters, 'model of dilemmas for designers' is termed as 'framework of dilemmas'. This change in terminology is due to evolving research insights during this PhD project.

satisfaction and joy. Yet, you might also feel guilty because this choice violates your concern for being mindful about the needs of your body. If you choose to skip the dessert, you might feel proud for controlling your urges; yet, you might also feel dissatisfied or even annoyed because of an unfulfilled desire.

What design can do with dilemmas

Designing with dilemmas can be beneficial both for the designer and the user. According to Glover, Ronning, and Reynolds, contradiction is a rich source of creativity because it stimulates the elimination of conflicts to restore balance (Benack, Basseches, & Swan, 1989; Ozkaramanli & Desmet, 2012). For instance, the Theory of Inventive Problem Solving (TRIZ) encourages design engineers to actively seek and eliminate conflicts among functional properties in a given design brief (Mann, 2001). De Bono's theory of lateral thinking maintains that serious creativity is enabled when designers build on contradictory opinions in an ideation session to improve emerging ideas (De Bono, 1995). Designing with dilemmas is also a user-relevant activity. Given that they are related to decision-making, dilemmas are a pervasive phenomenon in everyday life, and products play an important role in helping people manage these dilemmas. Many products that people use might not strike them as dilemma-inspired products at first; however, every product addresses one or more user concerns and, as illustrated in the examples in Figure 2.2, they often implicitly address conflicting user concerns.

By examining a set of existing products that appear to address dilemmas, three distinct design directions underlying these designs emerged. We first selected 109 existing products from design blogs, design shops, and graduation projects completed by masters-level students, based on whether the product could address conflicting user concerns. Because we did not have the opportunity to talk to the designers of each product, we selected ones that included detailed descriptions, clearly indicating which user concerns the design team wanted to address. For each of the 109 products, we formulated conflicting concern statements based on the product descriptions. In addition, we questioned how the selected products address dilemmas and categorized our conclusions based on the way they handle the conflicting concerns specifically involved in the dilemma. Our analysis

revealed three primary directions that designers use to deal with dilemmas:[4]

1. Resolving dilemmas. These interventions aim to redesign existing products, services, or environments in such a way that conflicting concerns can be simultaneously fulfilled.
2. Moderating dilemmas. These interventions aim to help users manage their dilemmas by explicitly prioritizing one concern over the other.
3. Triggering dilemmas. These interventions aim to draw attention to the concerns aroused by the dilemma and thus create awareness about the dilemma itself, without necessarily fulfilling any one of these concerns.

Figure 2.4 provides a collage of nine existing products that can address conflicting concerns using one of these three directions. We refer to these examples in the rest of this paper to elaborate on the proposed design directions.

Resolving dilemmas

Analysis of the selected products shows that many products and services aim to redesign an existing design concept in such a way that it resolves the dilemma, by simultaneously addressing conflicting concerns (see the example in Figure 2.1). For example, if you, as a user, are in a media store to buy a personal computer, you might ask yourself the following question: "Do I want a portable laptop, or do I want a powerful laptop?" On the one hand, you might be mesmerized by the size and lightness of one option, and on the other hand, you fear that it might not deliver the functionality you expect from one of its more powerful, yet heavier, competitors. In this situation, we can argue that the MacBook Air (see Figure 2.4) resolves this dilemma by fulfilling both the concern for portability and the concern for performance. By focusing on the conflict between these two concerns, instead of either concern in isolation, the MacBook Air creates a win-win situation and thus an emotionally satisfying product experience.

People's concerns do not necessarily focus only on product qualities, such as wanting a portable computer or enjoying a light breakfast. Desmet (2008) proposed that concerns can also be formulated with a focus on the qualities of the activity that the product enables (e.g.,

4 Details of this study can be found in the appendix.

Resolving Dilemmas

BREAST PUMP BAG BY MEDELA
A portable breast pump designed for working mothers to pump and store milk on the go.
CONCERN CONFLICT
I want to be a nursing mother
I want to be a working mother

MACBOOK AIR BY APPLE INC.
A very light and thin computer designed to balance both performance and portability.

CONCERN CONFLICT
I want to have a powerful computer
I want to have a portable computer

FLOATING MUG BY TIGERE CHIRIGA
A mug with an integrated coaster to protect surfaces from getting stained.

CONCERN CONFLICT
I want to keep my desk clean
I want to enjoy my coffee while working

Moderating Dilemmas

BOSSY BY LUCAS NEUMANN
A device that helps flextime employees to be balanced and effective in their daily lives.
CONCERN CONFLICT
I want to be productive
I want to check Facebook

SCRIBBLE ALARM CLOCK BY MAYHEM
Displays reminders on a dry-erase board that illuminates when the alarm sounds.
CONCERN CONFLICT
I want to wake up on time
I want to snooze in bed

MUFFINTOP BY FRED AND FRIENDS
Cupcake molds in the shape of tight blue jeans.
CONCERN CONFLICT
I want to be slim
I want to eat whatever I please

Triggering Dilemmas

CONFLICT KITCHEN
A pop-up food vendor that serves dishes from countries the U.S. is in conflict with; food wrappers feature excerpts of interviews conducted with people from both cultures.
CONCERN CONFLICT
I want to invest my energy in issues that matter to me personally
I want to be aware of global issues

DURR BY TVETERAS & VEDELER
A watch that vibrates every five minutes to draw the user's attention to the passage of time.

CONCERN CONFLICT
I want to follow my daily routine
I want to be aware of time passing

50-50 CAKE BY LASCHKE & HASSENZAHL
A baking dish that allows users to make one cake with two halves: one high-calorie and the other low-calorie.

CONCERN CONFLICT
I want to have a healthy diet
I want to eat whatever I please

Figure 2.4. *Collage of existing products that can address dilemmas through acting on conflicting concerns* [i]

"I want to travel light when carrying a computer," or "I want to feel energized after breakfast"). They might also focus on qualities of the self that the product expresses (e.g., "I want to have a hassle-free life," or "I want to be an energetic person") (Desmet, 2008). In light of this framework, conflicting concern statements can be formulated and resolved using any of these three qualitative levels (i.e., product, activity, or self). For example, we can argue that Apple's MacBook Air resolves the conflict between two concerns that focus on the qualities of the product (i.e., "I want to have a portable computer" vs. "I want to have a powerful computer"), while Medela's portable breast-pump resolves the conflict between two concerns that focus on the qualities of the self ("I want to be a nursing mother" vs. "I want to be a working mother"). Products can also resolve a conflict across different qualitative foci. For example, the Floating Mug (Figure 2.4) resolves the conflict between a concern focused on product qualities ("I want to keep my desk clean") and a concern focused on the qualities of the activity the product enables ("I want to enjoy a cup of coffee while working").[5]

Moderating dilemmas

Our analysis indicates that products can also support dilemma resolution by suggesting which concerns to prioritize. When conflicting concerns are associated with behavioral choices that cannot be made simultaneously, one choice has to be prioritized over the other, at least for the time being (Ozkaramanli, Özcan, & Desmet, 2017; Chapter 5 of this thesis). For example, an employee might want to wake up early to prepare for an important meeting at the office and, at the same time, want to relax in bed a little longer. However, both relaxing in bed and preparing for the meeting at the same time is impossible, and thus a choice must be made. The Scribble alarm clock in Figure 2.4 might motivate the person to wake up at a planned time by enabling the person to recall the most important task of the day (e.g., a work meeting).

Dilemmas in forced-choice situations often involve a distinction between a psychologically distant concern (e.g., "I want to lose weight") and an immediate concern ("I want to eat whatever pleases me") (Hofmann et al., 2012). Distant concerns are governed by the reflective system and guard long-term interests (i.e., long-term goals,

5 Also see Chapter 4 of this thesis.

aspirations, and personal values), while immediate concerns are governed by the impulsive system and guard short-term interests (i.e., desires and obligations) (Metcalfe & Mischel, 1999). Designing for the fulfillment of both distant and immediate concerns is important for subjective wellbeing (Desmet & Pohlmeyer, 2013). However, everyday conflicts between these concerns challenge people to forego pleasures (e.g., spending money, sleeping late, or drinking alcohol), or to exercise virtues such as kindness and honesty at a time when ignorance and lying would be more comfortable (Strayhorn, 2002). In fact, many individual and societal issues—ranging from healthy eating, to safe sex, to work productivity and environmentally friendly behavior—involve intrapersonal dilemmas of this kind. Therefore, designing products that can aid in the prioritization of distant concerns over immediate ones not only might help users to manage their dilemmas, but also might contribute to their subjective well-being.

In addition, explicitly addressing the distinction between distant concerns and immediate concerns doubles the design space by offering designers the opportunity either to stimulate behaviors that align with distant concerns (e.g., eating healthy snacks) or to discourage behaviors that align with immediate concerns and interfere with the achievement of distant concerns (e.g., indulging in sweets). For example, the KitchenSafe (see Figure 2.2a) addresses the dilemma between health and indulgence by creating a barrier to satisfying an immediate concern, such as finishing a bag of candy before dinnertime. Similarly, the Scribble alarm clock addresses the dilemma between competence and relaxation by creating an enabler that helps the user to fulfill a distant concern, such as waking up early to prepare for a work meeting. Moreover, Bossy (see Figure 2.4) acts both as an enabler and a barrier by suggesting activities that increase work time productivity (e.g., stretching) and hindering activities that decrease productivity (e.g., browsing the web aimlessly). In addition to acting as enablers and barriers, products can be designed to address the dichotomy between distant concerns and immediate concerns by making consequences of behavioral choices tangible and by adding new sources of displeasure/ pleasure to immediate desires/distant concerns (Ozkaramanli, Özcan, & Desmet, 2017; Chapter 5 of this thesis).[6]

6 Also see Chapter 5 of this thesis.

Triggering dilemmas

A distinct group of products stood out from the rest because they seemed to embody dilemmas instead of resolving them for or with the user. These products aim to engage people in a moment of personal reflection or discussion by triggering dilemma awareness. Experiencing a dilemma foregrounds the gains and losses involved in each choice and thus can create room for reflection between imperfect alternatives. On this experience, cognitive neuroscientist Steve Fleming (2014) writes "the agonizing feeling of conflict between two options is not necessarily a bad thing: It is the brain's way of slowing things down." For example, the Durr watch (see Figure 2.4) is a conceptually rich product that can address many dilemmas, one of which we can formulate as the conflict between "experiencing the passage of time" and "following a daily routine." With these concerns in mind, the Durr might trigger a dilemma each time the watch vibrates: Should I pay attention to it, or simply move on with my day? By raising awareness about the concerns involved in the dilemma without interfering with the choice, such products might engage people in a moment of "stop and think" behavior, where concern priorities are analyzed and possibly adjusted.

Triggering dilemmas might be particularly useful when people do not realize the consequences their choices have on their subjective well-being. For instance, many people have a concern for maintaining good health; however, specific moments of decision- making might not reflect this awareness. A person may think about ordering pizza after a hard day of work (concern for comfort), or might avoid talking about using a condom as a way to show trust in his or her partner (concern for intimacy). More importantly, people can easily justify their choices to maintain their cognitive consistency (Festinger, 1957). For instance, one might think "the pizza is only bread and cheese" or "if she had a sexually transmitted infection, she would have told me in advance." One way of intervening in these situations is by deliberately evoking cognitive dissonance in an attempt to challenge attitudes. For example, the Fifty-Fifty Cake (shown in Figure 2.4) aims to create "friction" (i.e., trigger a dilemma) by offering the user two options from which to choose: eating the healthy side or the unhealthy side of the cake first. By offering both options, the cake triggers a dilemma between the concern for health and the concern for enjoyment.

Our analysis suggests that to trigger dilemmas, designers have to (1) define the specificity of the dilemma to trigger, and (2) define the source of the ambiguity that triggers this dilemma. For example, the Fifty-Fifty Cake can trigger a specific pair of conflicting concerns (i.e., health vs. indulgence) and thus a specific dilemma, in the context of having tea. In contrast, the Durr watch (Figure 2.4) can trigger a range of dilemmas, depending on the user's physical and mental context during product use. In addition, triggering dilemmas often involves invoking the source of an ambiguity, which engages user reflection using the ambiguity as a cue (Dunne & Raby, 2013). All three examples shown in the bottom row of Figure 2.4 involve unconventional product experiences that distinctly differ from experiences with prototypical examples in the corresponding product categories (i.e., a typical snack-bar, a typical watch, or a typical cake mold). Conflict Kitchen, by communicating different cultural and political views through its brand identity, aims to help its customers engage with global issues; Durr uses novel interaction qualities to redefine the perception of time; and Fifty- Fifty Cake has different aesthetics than a regular cake mold.[7]

Reflection on the intentions and effect

Note that the proposed categories are based on an analysis of existing products. The relative depth of this analysis, and the nuances among the categories can be challenged by using them as input to create new products and services (i.e., as design directions). Our goal with these categories is to show how design has multiple ways to address users' dilemmas than merely trying to resolve them.

Although a product might be intended in a certain way, users might not infer the designer's intentions. One reason is that users and designers construct meaning in separate contexts that are influenced by different factors (Crilly et al., 2008). An important factor, for instance, is the design literacy of users (i.e., users' ability to interpret design intentions). For example, Tanya Heath shoes (Figure 2.1) is intended to resolve the dilemma between choosing a high-heeled shoe (concern for elegance) and a flat shoe (concern for comfort). However, Tanya Heath shoes can also spark discussions concerning how society expects elegant women to dress (e.g., women should look sexy, elegant, feminine, tall, slim, and so on); thus, it can also trigger dilemmas unintentionally.

7 Also see Chapter 6 of this thesis.

In addition, products can serve multiple intentions at the same time. Some of the products in Figure 2.4, such as Floating Mug and MuffinTop, are non-typical design examples compared to their prototypical examples, such as a typical mug or a cupcake mold. The attributes that make these products non-typical, or novel, help to emphasize the dilemma they address. For example, the conflict between cleanliness ("I want to keep my desk clean") and enjoyment ("I want to enjoy a cup of coffee while working") could also be resolved by incorporating a subtle coaster at the bottom of the cup. By explicitly integrating a coaster into the form of the cup, Floating Mug resolves and emphasizes this dilemma at the same time. Another example that might serve multiple intentions is MuffinTop molds; by using humor, they intend to raise awareness about the consequences of indulging in muffins. Here, the main intention might be to support the prioritization of health over indulgence; however, the product might also be experienced as a visual embodiment of this dilemma. As a result, for some people it might be an amusing product that influences eating behavior, but for others, it might trigger a dilemma by reinforcing the stereotypical expectations of a female figure.

Discussion

In this paper, we explored three design directions that highlight the possible contribution of using dilemmas as a starting point for user-centered design activities. These directions are: (1) resolving dilemmas, (2) moderating dilemmas, and (3) triggering dilemmas. Our analysis indicates that products designed with these intentions deal with conflicting concerns in distinct ways: simultaneously fulfilling conflicting concerns can resolve a dilemma; prioritizing one concern over the other can moderate a dilemma; and emphasizing the conflict among concerns can trigger a dilemma. By making these design directions explicit, we hope to create room for contemplating the differences among them and to stimulate creation of new design ideas. For example, it is interesting to think about how the Floating Mug (see Figure 2.4) can be redesigned to prioritize concern for cleanliness over concern for enjoyment. Or how can the same product be redesigned to trigger this dilemma? These mental exercises can open up space for new design ideas that might not otherwise be considered.

The conflicting concern statements can be formulated at varying levels of abstraction that are appropriate for the design direction to be used. For instance, to represent choices, concern statements are often

formulated at a concrete level that includes information about the design context (e.g., "I want to eat dessert after dinner" vs. "I want to have a healthy diet"). Such concrete formulations might work well for addressing dilemmas that are embedded in specific design contexts (e.g., snacking after dinner). Alternatively, concern statements can be formulated at an abstract level (e.g., "I want to be a nursing mother" vs. "I want to be a working mother"). Although these statements do not include contextual information, their open-ended nature creates space for a wider range of design solutions (Cross, 2004). This space might play an important role in conceptual design activities—for instance, when triggering dilemmas. The model of dilemmas shown in Figure 2.3 facilitates designers' navigation of various abstraction levels until they find the most inspiring level for a given design direction.

The three design directions proposed here share both similarities and differences. While products in the first category have a direct influence on the relationship between people and their environment (i.e., the product is the solution to the dilemma), products in the second and third categories mediate this relationship (i.e., the product is the means used to address the dilemma). Thus, the products have an indirect influence on the quality of this relationship. Although products in the second and third categories both mediate the relationship between people and their environment, they do so using different means. Products in the second category (i.e., moderating dilemmas) focus on managing the behavioral choices involved in a dilemma, while products in the third category (i.e., triggering dilemmas) focus on managing attitudes that might precede certain behaviors. Although behaviors and attitudes influence each other (i.e., changing one can lead to a change in the other) (see Olson & Zanna, 1993), these two design intentions rely on different sources of information and inspiration for their actualization.

The design directions we propose have implications for different fields of design. For example, the idea of resolving dilemmas by reconciling conflicting user requirements is common to manufacturing practices. For example, diet foods promise to deliver low-fat and tasty foods, which resolve the dilemma between health and indulgence. Smartphones serve as phones, cameras, agendas, computers, and music players, and these "all–in–one" features both introduce and eliminate many dilemmas, which makes the phones very popular. These examples indicate that identifying and resolving dilemmas might be a

means to develop innovative products and services that use conflicting concerns as a driver for innovation (Ozkaramanli et al., 2013).

In addition, moderating dilemmas can support dilemma management by prioritizing one or more concerns involved. This prioritization is particularly important when the satisfaction of remote concerns directly conflicts with concerns for instant gratification (e.g., being responsible vs. "one more drink for the road"). Dilemmas of this nature underlie many individual and social challenges, ranging from maintaining healthy eating habits and practicing safe sex to engaging in environmentally friendly behavior. More importantly, deliberations over such dilemmas negatively influence subjective well-being, while addressing distant concerns leads to enhanced subjective well-being (Emmons & King, 1988). Consciously buying and using "delayed gratification" products, such as KitchenSafe, Bossy, the Scribble alarm clock, or MuffinTop, indicates a person's commitment to protecting distant concerns from the interference of immediate ones. Therefore, studying the principles for designing these products might be a fruitful means to motivating behaviors that enhance subjective well-being.

By creating mental space for personal reflection or discussion, designing to trigger dilemmas is an intention in line with the goals of critical design. Critical design offers a fruitful design space for addressing complex societal issues, where asking questions are as important as finding solutions. Dunne and Raby refer to critical design as a way of highlighting dilemmas that can challenge existing belief systems and offer alternative ones (Dunne & Raby, 2013). This definition suggests an alignment between the goals of critical design and of designing to trigger dilemmas: to challenge the way people perceive and reflect upon their world. However, not all products that are intended to trigger dilemmas can be classified as critical design proposals. For example, Fifty-Fifty Cake and the Durr watch are not intended as critical designs, yet they still trigger dilemmas by raising awareness about conflicting concerns that people might otherwise not notice.

Designing to moderate or trigger dilemmas can be compared to design approaches that intend to influence user behavior, such as persuasive technologies (e.g., Fogg, 2003), pleasurable troublemakers (Hassenzahl & Laschke, 2015), social design (Tromp, 2013), and nudging (Thaler & Sunstein, 2008). Persuasive technologies and

pleasurable troublemakers influence behavior in a desirable direction, with users' conscious consent. In contrast, social design and nudging interventions implicitly steer behavior in a desirable direction (e.g., placing healthy food items at eye-level in school cafeterias to promote healthy eating), while still allowing users the freedom to make a different choice (e.g., choosing unhealthy food instead of healthy food). Designing with dilemmas balances the transparency of persuasive technologies with the intention to support the formation of a "self-nudging system" when dealing with these dilemmas. This balance is in line with the approach of Dorrestijn and Verbeek (2013), who stated, "Design for well-being… should attempt not only to influence human actions and decisions in desirable directions, but also to make it possible for users to develop an active and critical relationship with these influences."

Note that the proposed design directions for addressing dilemmas are based on an analysis of existing products and are representative of the current authors' interpretations of these products. Therefore, further evaluating the completeness of and the nuances among these directions is necessary—for example, by implementing them as a generative tool in new design assignments. In addition, our current experience indicates that the choice among these directions depends on the intentions of the designer and on the nature of the dilemma he or she wants to address. For instance, an effective way of dealing with moral dilemmas might be to trigger them to raise awareness about their complexity, while the best way to address environment-driven dilemmas often might be to resolve them. Therefore, evaluating the relationship between the nature of the dilemma and the designer's intentions is an opportunity for future research.

Appendix

Method

The main goal of this study was to understand the different approaches that designers can use to address people's dilemmas. Specifically, we focused on the following research question: What categories exist within the domain of dilemma-addressing product design?

The first step was to actively search for existing product examples that seem to address specific dilemmas. This was done through browsing design blogs (e.g., www.dezeen.com, www.core77.com, www.fastcodesign.com), design shops (e.g., local stores), and graduation projects completed by masters-level students at various institutions (e.g., Delft University of Technology, Design Academy Eindhoven). Occasionally, products that might address a specific dilemma, such as 'health vs. indulgence' or 'career vs. family' were sought. This search lasted for approximately one year and resulted in 109 existing product examples. Particularly, products with detailed descriptions clearly indicating which user concerns the design team wanted to address were selected. For example, OmieBox by OmieLife is a lunchbox designed for children. The design team communicates the essence of this product (i.e. what differentiates it from other lunchboxes) as follows: "A lunch box that holds hot and cold food so you can wrap their lunches with your love. Simple and easy to use, OmieBox makes every lunch perfect" (see www.omielife.com/omiebox). When reformulated, the conflicting concerns this product addresses are: "I want to provide my child with a variety of healthy school lunch food items" and "I want a lunchbox that is compact and simple to use". For each of the 109 products, a specific concern conflict (i.e., a dilemma) was formulated based on the product descriptions.

The second step was to analyze the existing products based on the way they address conflicting concerns. For this, a card was prepared for each product with an image, a short description, and the dilemma product addresses. In collaboration with the second and the third author, the cards were examined to (1) form consensus on the interpretation of the dilemma addressed by each product, and (2) reveal the similarities and differences between the approaches designers of these products seemed to use to address users' dilemmas.

References

Arnold, M. B. (1960). *Emotion and Personality (Vol. 1): Psychological Aspects.* New York, NY: Columbia University Press.

Austin, J. T., & Vancouver, J. B. (1996). Goal constructs in psychology: Structure, process, and content. *Psychological Bulletin, 120*(3), 338–375.

Benack, S., Basseches, M., & Swan, T. (1989). Dialectical thinking and adult creativity. In J. A. Glover, R. R. Ronning, and C. R. Reynolds (Eds.), *Handbook of Creativity* (pp. 199-208). New York, USA: Springer US.

Crilly, N., Good, D., Matravers, D., & Clarkson, P. J. (2008). Design as communication: exploring the validity and utility of relating intention to interpretation. *Design Studies, 29*(5), 425-457.

Cross, N. (2004). Expertise in design: An overview. *Design Studies, 25*(5), 427-441.

De Bono, E. (1995). Serious creativity. *The Journal for Quality and Participation, 18*(5), 12-18.

Desmet, P. M. A. (2002). *Designing Emotions.* Unpublished doctoral dissertation. Delft University of Technology, Delft, The Netherlands.

Desmet, P. M. A. (2008). Product emotion. In H. N. J. Schifferstein & P. Hekkert (Eds.), *Product Experience* (pp. 379-397). Amsterdam, The Netherlands: Elsevier.

Desmet, P. M., & Pohlmeyer, A. E. (2013). Positive design: An introduction to design for subjective well-being. *International Journal of Design, 7*(3), 5–19.

Dorrestijn, S., & Verbeek, P. P. (2013). Technology, wellbeing, and freedom: The legacy of utopian design. *International Journal of Design, 7*(3), 45-56.

Dunne, A., & Raby, F. (2013). *Speculative Everything: Design, Fiction, and Social Dreaming.* Cambridge, MA: MIT Press.

Emmons, R. A., & King, L. A. (1988). Conflict among personal strivings: Immediate and long-term implications for psychological and physical well-being. *Journal of Personality and Social Psychology, 54*(6), 1040-1048.

Erikson, E. H. (1980). *Identity and the Life Cycle.* New York: WW Norton & Company.

Festinger, L. (1957). *A Theory of Cognitive Dissonance.* Stanford, CA: Stanford University Press.

Fleming, S. (2014, January 8). "Hesitate! Indecisions is sometimes the best way to decide" *Aeon Magazine,* http://aeon.co/magazine/psychology/indecision-issometimes-the-best-way-to-decide/ (Last accessed 31 May, 2015).

Fogg, B. J. (2003). *Persuasive Technology: Using Computers to Change What We Think and Do.* Boston, MA: Morgan Kaufmann.

Freud, S. (1929). *Civilization and its Discontents.* London: Penguin Books.

Hassenzahl, M., & Laschke, M., (2015). Pleasurable Troublemakers. In Steffen Walz and Sebastian Deterding (Eds.), T*he Gameful World,* (pp. 167-195). Cambridge, MA: MIT Press.

Hofmann, W., Baumeister, R. F., Förster, G., & Vohs, K. D. (2012). Everyday temptations: An experience sampling study of desire, conflict, and self-control. *Journal of Personality and Social Psychology, 102*(6), 1318-1337.

Lewin, K. (1935). *A Dynamic Theory of Personality.* New York: McGraw-Hill.

Mann, D. (2001). An introduction to TRIZ: The theory of inventive problem solving. *Creativity and Innovation Management, 10*(2), 123-125.

Metcalfe, J., & Mischel, W. (1999). A hot/cool-system analysis of delay of gratification: Dynamics of willpower. *Psychological Review, 106*(1), 3-19.

Olson, J. M., & Zanna, M. P. (1993). Attitudes and attitude change. *Annual Review of Psychology, 44*(1), 117-154.

Ozkaramanli, D., & Desmet, P. M. A. (2012). I knew I shouldn't, yet I did it again! Emotion-driven design as a means to motivate subjective well-being. *International Journal of Design, 6*(1), 27–39.

Ozkaramanli, D., Fokkinga, S. F., Desmet, P. M. A., Balkan, E., & George, E. (2013). Recreating AlaTurca; consumer goal conflicts as a creative driver for innovation. In D.S. Fellows (Ed.), Brilliant Transformations: *Proceedings of Qualitative Research 2013,* Valencia, 17-19 November. Amsterdam (NL): ESOMAR.

Ozkaramanli, D., Özcan, E., & Desmet, P. M. A. (2017). Long-term goals or immediate desires? How to use self-Control dilemmas to design for distant gains. *The Design Journal, 20*(2), 219-238.

Piaget, J. (1952). *The Origins of Intelligence in Children.* New York: International Universities Press.

Strayhorn, J. M. (2002). Self-control: Theory and research. *Journal of the American Academy of Child & Adolescent Psychiatry, 41*(1), 7-16.

Thaler, R. H., & Sunstein, C. R. (2008). *Nudge: Improving Decisions about Health, Wealth, and Happiness.* New York: Penguin Books.

Tromp, N. (2013). *Social Design.* Unpublished doctoral dissertation. Delft University of Technology, Delft, The Netherlands.

[i] Image credits for Figure 2.4:

- Breast Pump Bag by Medela. Photo by the first author.
- Macbook Air by Apple, Inc. Photo by the first author.
- Floating Mug by Tigere Chiriga. Photo by the first author.
- Bossy by Lucas Neumann. Photo: Courtesy of the designer.
- Scribble Alarm Clock by Mayhem. Photo by the first author.
- Muffintop by Fred and Friends. Photo by the first author.
- Conflict Kitchen by Brett Yasko. Photo: Courtesy of Conflict Kitchen.
- DURR by Theo Tveteras and Lars Vedeler. Photo: Skrekkøgle. Courtesy of the designers.
- 50-50 Cake by Matthias Laschke and Marc Hassenzahl (in) Hassenzahl, M., & Laschke, M. (2015). Pleasurable Troublemakers; In S. Walz & S. Deterding (Eds.), The Gameful World (Cambridge, MA: MIT Press),167–95. Photo: Matthias Laschke. Courtesy of the designer.

CHAPTER 3

Is this a design-worthy dilemma? Identifying relevant and inspiring concern conflicts as input for user-centered design

This chapter is entirely based on the following journal article: Ozkaramanli, D., Desmet, P.M.A., & Özcan, E. (In press). Is this a design-worthy dilemma? Identifying relevant and inspiring concern conflicts as input for user-centered design. *Journal of Design Research*.[1]

Abstract

Personal dilemmas can be valuable starting points for user-centred design. Since dilemmas prevail in everyday life, designers can identify many dilemmas relevant for a given design brief. It can therefore be a challenge to choose a target dilemma as a means to frame an appropriate problem space. To address this challenge, this paper proposes seven qualities of 'design-worthy' dilemmas. These key qualities were derived from a cross-comparison of four dilemma-driven design cases, and were clustered in three categories: (1) relevance for target users, (2) potential to inspire design ideas, and (3) meaningful formulation of conflicting concerns. The qualities of design-worthy dilemmas explicate the considerations designers have when selecting a target dilemma, and thus, they can facilitate introspection and discussion in problem framing. In addition, the case studies demonstrate the main activities involved in dilemma-driven design, namely discovery, definition, and application.

Keywords: concern conflict; dilemma-driven design; user-centered design; problem framing; design process

1 This chapter is entirely based on the stated journal article without any modifications to its content. The style and formatting of the article have been modified to match the visual style of the thesis, and references to other thesis chapters have been added where appropriate.

Introduction

Everyday life is replete with personal dilemmas: wanting to snooze in bed instead of getting up, choosing a chocolate bar rather than a piece of fruit as an afternoon snack, reluctance to compromise from leisure time to meet an urgent deadline, or having second thoughts about a job offer are only a few examples of personal dilemmas. Such dilemmas are often linked to personal values and high-level human motivations, such as being a responsible person, maintaining good health, or attaining professional success. Therefore, it has been suggested that they constitute a viable problem space for addressing psychological and behavioral needs through the design of products and services (Ozkaramanli, Desmet, & Özcan, 2016; Chapter 2 of this thesis). Designing with personal dilemmas has been implemented in a multitude of design projects (e.g., Ozkaramanli & Desmet, 2012; Ozkaramanli et al., 2013; Bins, 2014; Coehoorn, 2014; Innemee, 2014). These projects revealed that every personal dilemma represents a new design challenge, which necessitates focusing on a specific dilemma when constructing a viable problem space. At the same time, selecting a target dilemma can be a challenge, since there might be numerous dilemmas relevant for a given design brief. In this paper, we address this challenge, namely how to best select a target dilemma when framing design problems. Ultimately, we aim to reveal the key qualities that make a dilemma *worthy* of design.

Design problems are characterized as ill-structured problems: they often have unclear formulations, malleable goals, and multiple possible solutions and solution paths (Simon, 1973; Jonassen 1997). These characteristics necessitate dealing with uncertainty in design activities and making decisions based on the best possible judgment. One of the most important decisions in ill-structured problem solving is framing an appropriate problem space by exploring and restricting alternatives and refining arguments (Jonassen, 1997). Problem framing plays an important role in clarifying and justifying decisions at the initial phases of the design process (e.g., the fuzzy front end, see Buijs, 2003), as well as in bridging analysis and synthesis (see Roozenburg & Eekels, 2005). Several models can explain problem framing. Schön (1991) characterized the design process as a reflective conversation the designer has with the situation. In this conversation, framing refers to understanding the issues to be tackled through iterative thought experiments. Simon (1969) suggested that problem solving is a rational process, in which the development of solutions furthers the

understanding of the problem. This iterative handling of the problem and solution is referred to as the co-evolution model (e.g., Dorst & Cross, 2001).

Jonassen (2000, pp. 80-81) stated that dilemmas are the most vexing type of ill-structured problems characterized by multiple conflicting perspectives. Because of this, addressing dilemmas requires multi-disciplinary expertise in order to best manage compromises that might otherwise remain implicit in the proposed solutions (Jonassen, 2000). Framing design problems as personal dilemmas (e.g., "I want to get a promotion at work" vs. "I want to spend more time with my family") explicates these conflicting perspectives, and thus, captures the complexity of many individual and societal issues (Ozkaramanli, Desmet, & Özcan, 2016; Chapter 2 of this thesis). Due to these characteristics, dilemmas have become a topic of interest in design fields such as design for subjective wellbeing and design for behavior change. For instance, Desmet and Pohlmeyer (2013) proposed a framework for positive design (i.e., design for subjective wellbeing) that is sensitive to conflicts between any of its three constituents, namely pleasure, personal significance, and virtue. Design for behavior change often addresses the behavioral manifestations of personal dilemmas, particularly those related to self-control challenges (e.g., smoking, overeating, failing to recycle) (e.g., Lockton, Harrison, & Stanton, 2010). Social design methodically addresses social dilemmas in which behaviors involving personal benefits conflict with those benefiting the society (e.g., over-spending, speeding, littering) (Tromp, 2013). In addition, the field of critical design raises awareness about dilemmas of socio-cultural significance to stimulate discussion around topics such as sustainability or technological advances (Dunne & Raby, 2013).

Selecting a dilemma to design with can be a challenge not only because dilemmas have multi-faceted structures as exemplified above, but also because people experience many dilemmas relevant for any design context. Imagine, for instance, having dinner at your favorite restaurant. In this context, the conflict between "I want to have an indulgent dessert" (concern for enjoyment) and "I want to maintain my healthy diet" (concern for health) is only one of the many dilemmas you might experience. Researching such a context will reveal multiple other concerns and concern conflicts, such as "I want to order a dish I did not taste before, but I also want make sure that I

will enjoy my dinner" (i.e., novelty vs. security); "I want to taste a bit of everything, but I do not want to waste food" (i.e., exploration vs. responsibility); or "I want to have an appetizer, but I do not want to keep my friend, who will not have an appetizer, waiting for his dinner" (i.e., enjoyment vs. belonging). These dilemmas are experienced either simultaneously or sequentially; some are experienced repetitively, while others seem incidental; and some are ideological in nature, while others are relatively more practical. In summary, the decision on what dilemma to focus on can be a challenge due to the diversity and abundance of dilemmas relevant for a given design context.

In this paper, we examine the main activities designers engage in across four dilemma-driven case studies, with a specific focus on the considerations mentioned when selecting a target dilemma. In each case, a number of dilemmas were identified, and a promising dilemma was selected as input for further design activities. In the next section, the four cases are presented, including aims, outcomes, and relevant design considerations. Next, we present seven key qualities of design-worthy dilemmas, which were identified by cross-examining the design cases. Finally, we discuss the relationship between using these qualities and framing an appropriate problem space.

Designing with dilemmas: Four case studies

In the context of dilemma-driven design, we define a dilemma as the experience of having to make a choice between two mutually exclusive alternatives, both of which touch upon personal concerns, and the simultaneous fulfillment of which is challenging, if not impossible (Ozkaramanli, Desmet, & Özcan, 2016; Chapter 2 of this thesis). Because of this challenge, people experience both positive and negative emotions towards each choice (Ozkaramanli, Desmet, & Özcan, 2016; Chapter 2 of this thesis). Figure 3.1 illustrates the three main ingredients of a dilemma, namely conflicting concerns, mixed emotions, and mutually exclusive choices, using the example of wanting to relax in bed instead of waking up at a planned time.[2]

The theoretical insights into dilemma experiences are very useful for examining users' dilemmas, but they do not offer clues for selecting

2 The development of this framework is based on the phenomenological study reported in Chapter 5. Therefore, for a more detailed understanding of this framework, please refer to Chapter 5.

those that are most fruitful in design initiatives. Therefore, we used a bottom-up approach to address the challenge of selecting a target dilemma. We collected qualitative data on designers' considerations when selecting a target dilemma across four exploratory design cases that were conducted sequentially (see Thomas, 2011). Case studies allow for researching a phenomenon in its context using multiple sources for data collection (Yin, 1984). Characterized by questioning, noticing, and expert interpretation, case study approach offers exemplary (vs. generalizable) knowledge based on the unique and complex context of the case (Thomas, 2010). By reflecting on designers' considerations when selecting a target dilemma across four dilemma-driven case studies, we gathered insights into the qualities of design-worthy dilemmas.

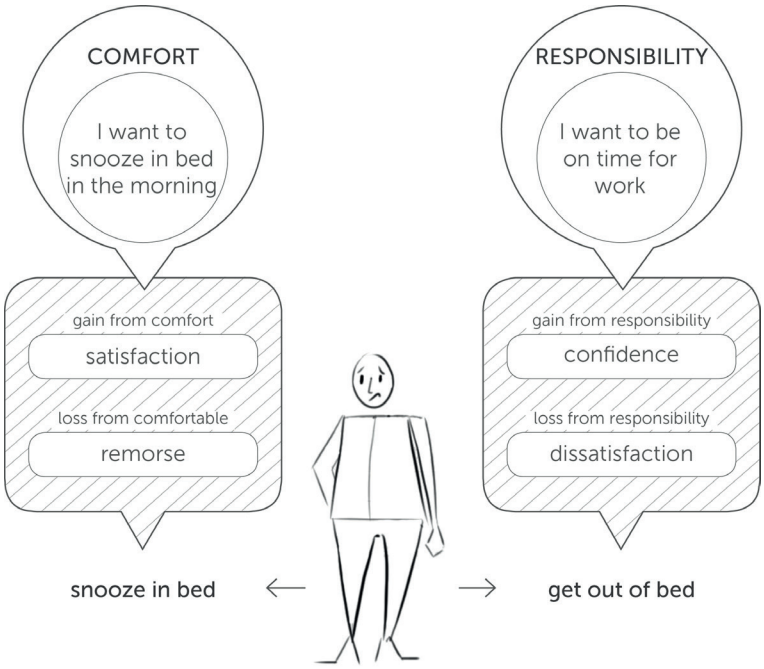


Figure 3.1. Framework of dilemmas, illustrating the conflict between the concern for comfort and the concern for responsibility in the context of waking up

Description of the case studies

Designers engage in three main activities when designing with dilemmas. These are *discovery, definition,* and *application* (Ozkaramanli, Özcan, & Desmet, 2014). *Discovery* involves identifying dilemmas using various research methods, such as experience sampling and in-depth interviewing, as well as methods that do not necessitate the direct involvement of users (e.g., interviews with domain experts). *Definition* involves analyzing dilemmas to reveal their main ingredients (see Figure 3.1). This facilitates an in-depth

understanding of identified dilemmas and supports the selection of a target dilemma. *Application* involves generating ideas that can address the selected dilemma.

All case studies followed the three activities of dilemma-driven design. Three of the cases were in the format of a graduation project conducted at Delft University of Technology. A graduation project is the final project completed by master-level design students at the Industrial Design Engineering Faculty of Delft University of Technology. During these projects, students work individually and are free to choose their own topic and supervisory team (i.e., two academic supervisors and a company mentor if the project is in collaboration with a third-party). Graduation projects are finalized within six to eight months.

The fourth case study was conducted in the format of a design workshop during a course on emotion-driven design taught to master-level students at Delft University of Technology. This format was specifically selected to accommodate the nature of the co-exploration procedure used to identify dilemmas. Twelve designers worked in teams of four people assigned by the course teachers (first and second author). The goal of the workshop was to design an intervention that could nurture the experience of visiting a cemetery or attending a funeral using dilemmas as a starting point. Table 3.1 summarizes the design brief, method used to identify dilemmas, and the format of each case study.

The Uniekies Game: Improving the social interaction between children with and without a physical disability

Problem statement: Children with a physical disability often have difficulties connecting with other children during play activities. This is due to their limited physical abilities and rejection by able-bodied children. Nowadays, a lot of attention is paid to accessibility in play (i.e., the removal of physical barriers), while little attention is paid to inclusion (i.e., the removal of social barriers). This leads to peer isolation. Therefore, enabling social inclusion can improve the quality of life and happiness of disabled children.

Design brief: Design a play activity to change the mind-set about disabled children by improving the social interaction between children with and without a physical disability.

Table 3.1. Summary of the case studies

Case	Design brief	Method used to identify dilemmas	Format and timing
1	Design a play activity to improve the social interaction between children with and without a physical disability by changing the mind-set about disabled children. [i]	Emotion Capture Card procedure	Graduation project (06/2013 – 01/2014)
2	Design an intervention to support people in dealing with conflicting life-goals by triggering them to question their (limiting) convictions, such as the fear of missing out. [ii]	Experience booklets followed by in-depth interviewing	Graduation project (10/2013 – 06/2014)
3	Design an intervention to encourage doubtful citizens to support renewable energy production by triggering them to consider the gains and losses of having a wind-farm in their neighborhood. [iii]	Experience booklets followed by in-depth interviewing	Graduation project (03/2014 – 12/2014)
4	Design an intervention to nurture the experience of visiting a cemetery or attending a funeral by using dilemmas as a starting point. [iv]	Co-exploration procedure	Design workshop (05/2015)

Design concept: The Uniekies Game (Figure 3.2) introduces disabled children as heroes with special powers who are to be admired. Able-bodied children can also become heroes by dressing up in special suits and training their powers. For example, Bumper symbolizes a child in a wheelchair who cannot run, but has the unique power of quickly clearing off the play-path for his followers. When playing the game, an able-bodied child can wear a balloon-suit to experience the challenges of being in a wheelchair in a fun way. The Uniekies Game consists of six super-heroes, whose playsuits can be prepared with everyday materials, such as balloons, kitchen foil, and umbrellas.

Method used to identify dilemmas: The Emotion Capture Card (ECC) procedure was used in three play sessions to identify dilemmas of able-bodied children, disabled children, and their caretakers. Frijda (1988) formulated the "law of concern", which states that every emotion hides a concern. In line with this law, an individual's emotions can be considered as reliable entry points to their concerns. The ECC procedure is based on this law of concern, and it follows three main stages: (1) capturing emotions, (2) distilling concerns, and (3) formulating dilemmas (Ozkaramanli et al., 2013). In the first stage, the researcher captures emotions (both positive and negative) through

Figure 3.2. The Uniekies Game and the instructions for creating super-hero suits (reprinted with permission)

immersing in the context of design (in this case, the play context) in a relatively unobtrusive way. Participants (in this case, the children and caretakers) can either report emotions as they arise, or researchers can prompt for an emotion when they observe an emotional event. Next, the researcher interviews the participant using a laddering-type technique to deepen the understanding of concerns underlying captured emotions (see Reynolds & Gutman, 1988). In the second stage, researchers distil concerns from each ECC, and cluster similar concerns to form an overview of the participants' concerns. In the third stage, researchers explore the relationships among the concern clusters, which lead to the identification of (potential) dilemmas (for details of the ECC procedure, see Ozkaramanli et al., 2013).

Identified dilemmas: Researching the concerns of able-bodied children, disabled children, and their caretakers generated 102 Emotion Capture Cards, which yielded 102 concerns relevant for social play. After analyzing the conflicting relationships among these concerns, the designer identified twelve dilemmas. Table 3.2 outlines three of these dilemmas, supported by participant quotes. Among these, the designer selected the dilemma of the able-bodied children as input for ideation, which is formatted in **blue** in Table 3.2 and illustrated in Figure 3.3 using the framework of dilemmas.

Table 3.2. Identified dilemmas and the selected dilemma for the Uniekies Game

Dilemma	Quote
Able-bodied children's dilemma: I want to be challenged during play activities (concern for fun) , but I also feel the need to include everyone in the play, even if they are less competent (concern for unity). [v]	*"I am willing to let everyone play along, but when other children cannot run or jump like I do, it slows down the game and I get bored."*
Disabled children's dilemma: I want to be treated equally (concern for equality), but I also want others to help me when I need it (concern for receiving support).	*"I want to be seen as a play-mate who can be as fun as other children, but when I need help, I expect others to help me."*
Parents' dilemma: I want my child to feel as competent as other children (concern for competence); however, he should also be aware of and accept the limitations of his disability to be happy (concern for self-awareness).	*"I have the urge to help my child in performing certain tasks or to encourage him too much, but this can make him feel like he is not good enough."*

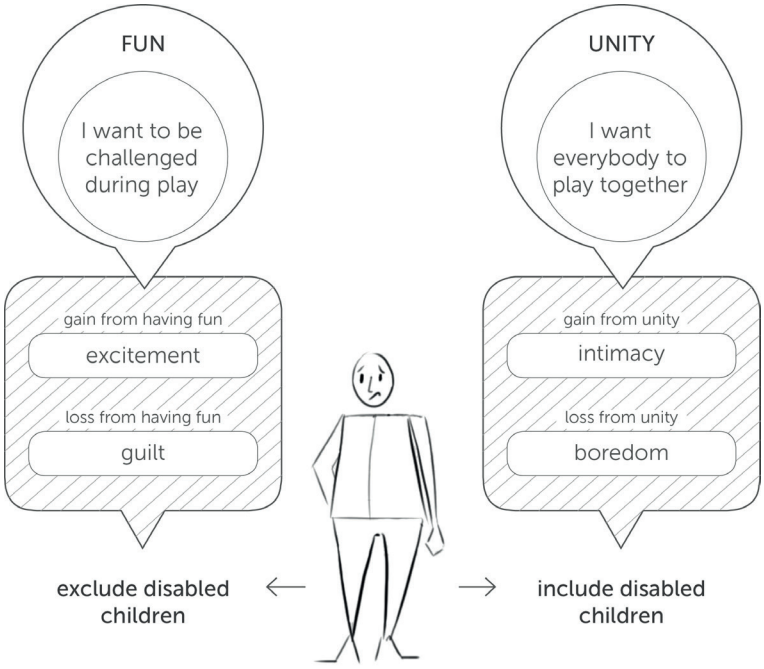


Figure 3.3. Dilemma framework illustrating the conflict between the concern for fun and the concern for unity in the context of social play

Attention Seeker: A design intervention to balance conflicting life-goals

Problem statement: This project focused on people who have difficulty balancing the competing demands of living in a modern society. When people have multiple strivings that conflict with one another, i.e., when they have conflicting life-goals such as meeting a deadline vs. spending time with friends, they can experience fear of failure as well as fear of missing out. Such conflicts among life-goals fixate people on the lack of resources (e.g., time and money), and thus, they can threaten mental wellbeing. In contrast, focusing on developing personal strategies to balance conflicting life-goals can enhance mental wellbeing.

Design brief: Design an intervention to support people in dealing with conflicting life-goals by triggering them to question their (limiting) convictions such as the fear of missing out.

Design concept: The Attention Seeker (Figure 3.4) intends to confront people with their urge to constantly engage with their smartphones, which can be interpreted as a behavioral manifestation of the fear of missing out. It is an interactive coaster that responds to mobile-phone usage within its surroundings by randomly moving around when it senses smartphone usage. When placed on the table in social venues (e.g., cafés or meeting rooms), a radio-frequency detector recognizes smartphone usage, and a motorized mechanism allows the device to move randomly until it grabs attention. Over time, people associate these movements with smartphone usage, which might trigger thinking about the need to continually check their phone.

Method used to identify dilemmas: Experience booklets followed by in-depth interviewing were used to research the concerns and dilemmas of ten participants who voiced complaints about struggling with limited resources such as time and energy. Experience booklets provide a medium for participants to record their dilemmas by answering a number of questions designed to probe these experiences (see Ozkaramanli, Özcan, & Desmet, 2014). In this particular project, the designer prepared a booklet with three to six open-ended questions that were phrased in an easy-to-understand way. In addition, the design of the booklet (e.g., size, format, colors, illustrations) aimed to invite and engage the participants with reporting their experiences. Following the completion of the booklet, an in-depth interview was

Figure 3.4. Attention Seeker intends to trigger reflection about smartphone usage in social settings (reprinted with permission)

conducted with each participant to detail the dilemmas reported in the booklet.

Identified dilemmas: Individual interviews yielded four to six dilemmas per participant. The designer identified seven dilemma clusters through grouping together similar dilemmas and the factors that influence these dilemmas (e.g., loss aversion, high personal expectations, and so on). Table 3.3 outlines three of these dilemmas, supported by quotes from the research participants.

The designer concluded that the main conflict that could explain the majority of the dilemmas voiced by the participants was the conflict between managing tasks efficiently vs. wanting to have an ease of mind. She formulated this dilemma as follows: *I want to be up to date with all developments regarding my work* (concern for management), *but this prevents me from being fully present in my physical environment, especially in a social setting* (concern for tranquility). This dilemma is illustrated in Figure 3.5.

Table 3.3. *Identified dilemmas and the selected dilemma for Attention Seeker*

Dilemma	Quote
I want to utilize every opportunity to do a new project (concern for professional success), but also, I want to have enough time to take good care of myself (concern for self-care).	*"I had an article published in a magazine which led to many offers for freelance projects. I accepted most of them, and I also kept my full-time job. This led to a burnout. Now, I realize that self-worth does not solely rely on career performance."*
I want to be outspoken about my thoughts and feelings at work (concern for self-expression), but I am afraid of hurting others or damaging my position (concern for belonging).	*"Something was bothering me at work, but I was afraid to discuss it with my boss; I wanted to stand up for myself, but I did not want to hurt others."*
I want to have a good relationship with my daughter (concern for belonging), but I find it difficult to reset my plans every time she wants something from me (concern for individuality).	*"My daughter can demand a lot of attention, and I am afraid to say "no" to her. My relationship with her is very important for me, but I don't know whether I can keep delaying my own plans."*

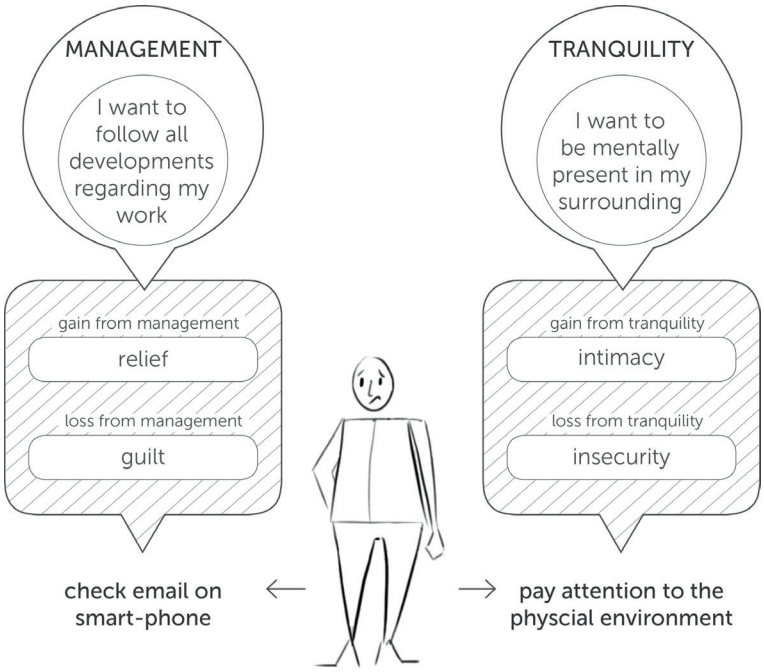


Figure 3.5. *Dilemma framework illustrating the conflict between the concern for management and the concern for tranquility in the context of dealing with stress*

Look-out Point: creating support for the implementation of residential wind-farms

Problem statement: Although the majority of citizens support the idea of renewable energy, local communities resist the implementation of windmills in their neighborhood. Any future benefit, such as being independent of large energy companies or contributing to a sustainable future, fails to evoke positive emotions when people fear the negative consequences of a having a wind-farm in their neighborhood, such as the sight and sound of windmills. These negative consequences become even more threatening when opposing parties communicate them using an emotionally provocative language. As a result, the majority of citizens receive the positive messages of wind-farm supporters with suspicion and choose to remain undecided about the implementation of a wind-farm. Under these circumstances, local governments often postpone or cancel implementation plans.

Design brief: Design an intervention to encourage the doubtful citizens to support renewable energy production by triggering them to consider the potential gains and losses of having a wind-farm in their neighborhood.

Design concept: Look-out Point (Figure 3.6) intends to raise awareness about the 'certainty of change' in the surroundings. This observation-point invites residents to visit a website that can update them about the potential spatial developments in their neighborhood. On the

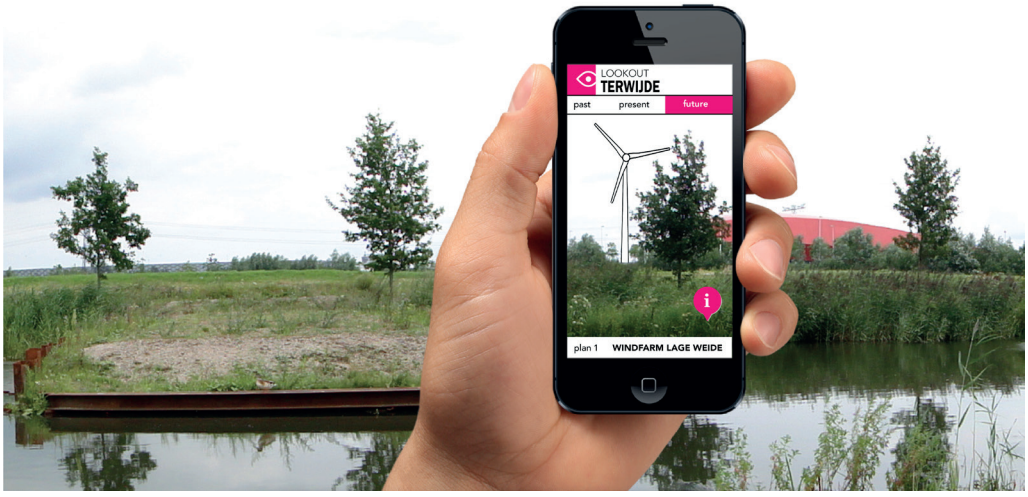


Figure 3.6. Look-out Point provides information on the past, present and future of a specific neighborhood and visualizes different future scenarios that the citizens can vote for (reprinted with permission)

website, residents can explore images of their neighborhood at three points in time (past, present, and future) from the perspective of a specific observation-point (i.e., the look-out point). The *past* option shows photos retrieved from the archives of the local municipality; the *present* option shows the current images of the neighborhood; and the *future* option illustrates several future scenarios such as having a future wind-farm, a crematorium, or wider roads in the neighborhood.

Method used to identify dilemmas: In this project, the same procedure used in the second case study was used (i.e., experience booklets followed by in-depth interviewing) to identify concerns and dilemmas of seven people who were doubtful about the implementation of residential wind-farms.

Identified dilemmas: Six dilemmas were identified, three of which were related to people's perception of windmills, and three were related to the political aspects of wind-farm implementation. Table 3.4 outlines three main dilemmas identified in this project, supported by quotes from the research participants. Among these, the designer selected the dilemma that is formatted in **blue** in Table 3.4 and illustrated in Figure 3.7.

Nurturing the experience of visiting a cemetery or attending a funeral

Problem statement: Visiting a cemetery or attending a funeral are psychological experiences that carry personal and cultural significance. Being in these situations can be both awkward and comforting. This is because many personal concerns are at stake, such as acting appropriately, expressing emotions, or showing responsibility. Although cemeteries possess an important role in personal and community life, their designs do not always support these psychological functions.

Design brief: Design an intervention that nurtures the experience of attending a funeral or visiting a cemetery by using people's dilemmas as a starting point.

Table 3.4. *Identified dilemmas and the selected dilemma for Look-out Point*

Dilemma	Quote
I want to be informed about the spatial changes in my neighborhood (concern for understanding), but I do not always feel like reading the complex newsletters, even if they are socially relevant (concern for comfort).	*"We receive letters from the municipality about potential changes in our town, but they are written in such a complex and lengthy way that I never feel like reading them."*
I want to enable my community to produce and consume its own renewable energy (concern for autonomy), but I am afraid that implementing wind-farms will destroy the local identity of my neighborhood (concern for security).	*"This neighborhood has looked and felt this way for years. By having those huge machines nearby, it will never look and feel the same."*
I want to welcome changes in my neighborhood that can benefit a sustainable society (concern for social responsibility); however, I do not want my neighborhood to be the only one that is willing to do so (concern for equality).	*"It is difficult to know where and why the government decides to implement these wind-farms; and what if our community says yes to wind-farms and many others say no?"*

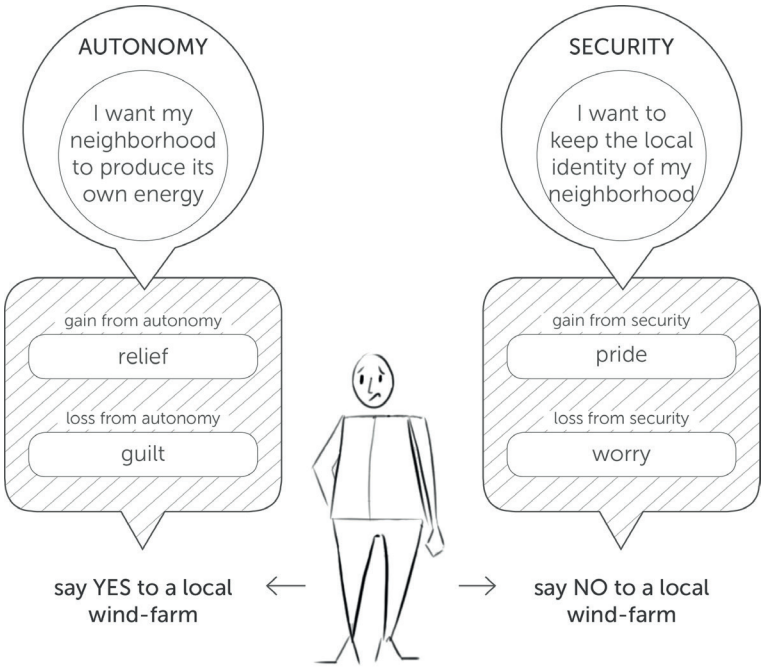


Figure 3.7. *Dilemma framework illustrating the conflict between the concern for autonomy and the concern for security in the context of residential wind-farm implementation*

Figure 3.8. The Comfort Swing encourages people to support each other at a funeral

Design idea (team 1): Comfort Swing encourages people to show that they care about other people's loss and that they are at the funeral to support them. The swing has two seats, and to balance the height of the two seats, two people need use it together. Seeing a person approaching the swing can encourage another person to sit on the other side to balance the two seats. This will raise the first seat above the ground, and metaphorically, raise the mood of the person being accompanied.[vi]

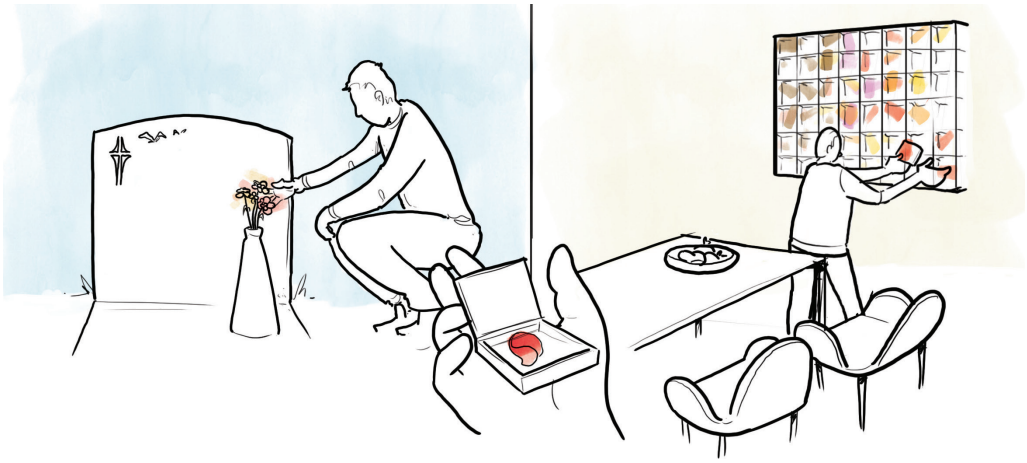


Figure 3.9. Petal subtly reminds the person about time spent grieving

Design idea (team 2): Petal is an organically changing wall piece that subtly reminds the person to visit the grave of a loved one, while also encouraging him to move on with his life. After placing a bouquet of flowers on a grave, the person can bring back one petal leaf and put it in one of the glass boxes of the wall piece. With time, the degrading petals will remind the person that it has been a long time since his last visit to the cemetery. At the same time, the increasing number of petals will symbolize the length of time he has been grieving. [vii]

Figure 3.10. The Cardboard Coffin helps to gradually turn a grave into a flowerbed

Design idea (team 3): The Cardboard Coffin is a sober coffin that transforms the grave into a flowerbed after the deceased is buried. The cardboard is a low-cost, natural material in which small flower seeds can be embedded. As the coffin deteriorates, the seeds sprout out and transform the grave into a colorful place of remembrance. [viii]

Method used to identify dilemmas: Using a procedure called co-exploration, twelve designers worked in teams of four to collaboratively formulate hypothetical dilemmas in the context of visiting a cemetery or attending a funeral. The teachers suggested two techniques for this procedure that were facilitated by two sets of cards: goal cards and product cards. The goal cards are inspired by the goal taxonomy of Ford (1992). These goals are abstract and general in nature, for which there can be various, situation-specific concerns associated with each goal. For example, the goal of belonging can be associated with spending time with loved ones, feeling like part of a team, or supporting a particular charity group. By pairing two random goal cards, the design teams could collaboratively explore situations in which these two goals could conflict, leading to a potential dilemma. The product cards are inspired by the Google product taxonomy, and they can facilitate brainstorming about user concerns that a specific product can fulfill or harm. By examining the relationships among these concerns, the design teams could identify potential dilemmas relevant for a specific product (e.g., a coffin, a flower bouquet).[3]

3 This design case (i.e., nurturing the experience of visiting a cemetery or attending a funeral) is also part of the study reported in Chapter 7. For purposes of this Chapter, only the work of three teams that used the co-exploration procedure has been reported. In Chapter 7, the methods used in this design case are discussed in greater detail.

Identified dilemmas: Each design team identified three dilemmas, which led to nine dilemmas in total. Below, we describe two dilemmas per team. The selected dilemmas are formatted in **blue** in Table 3.5 and illustrated in Figure 3.11.

Table 3.5. Identified dilemmas and the selected dilemma for the cemetery/funeral brief

Team	Dilemma
1	I do not want to attend the funeral (concern for tranquility), but at the same time, I want to show my respect towards the people who have lost a loved one (concern for responsibility). I want to comfort others and give my support at a funeral (concern for giving support), but at the same time, I want to isolate myself from others to process my own loss (concern for tranquility).
2	I want to move on with my life (concern for harmony), but I feel the emotional need to visit the grave of my loved one every day (concern for belonging). When I visit the cemetery, I want to express my feelings of happiness or sadness freely (concern for self-expression), but at the same time, I want to make sure that I act appropriately and do not disrespect others (concern for responsibility).
3	I want to organize a special funeral to say goodbye to my loved one (concern for belonging), but I find it difficult to rationalize spending a lot of money on buying a sophisticated coffin (concern for material loss). I want to keep the grave of my loved one to honor his presence (concern for personal responsibility), but I am also aware that cities lack the space to accommodate large cemeteries (concern for social responsibility).

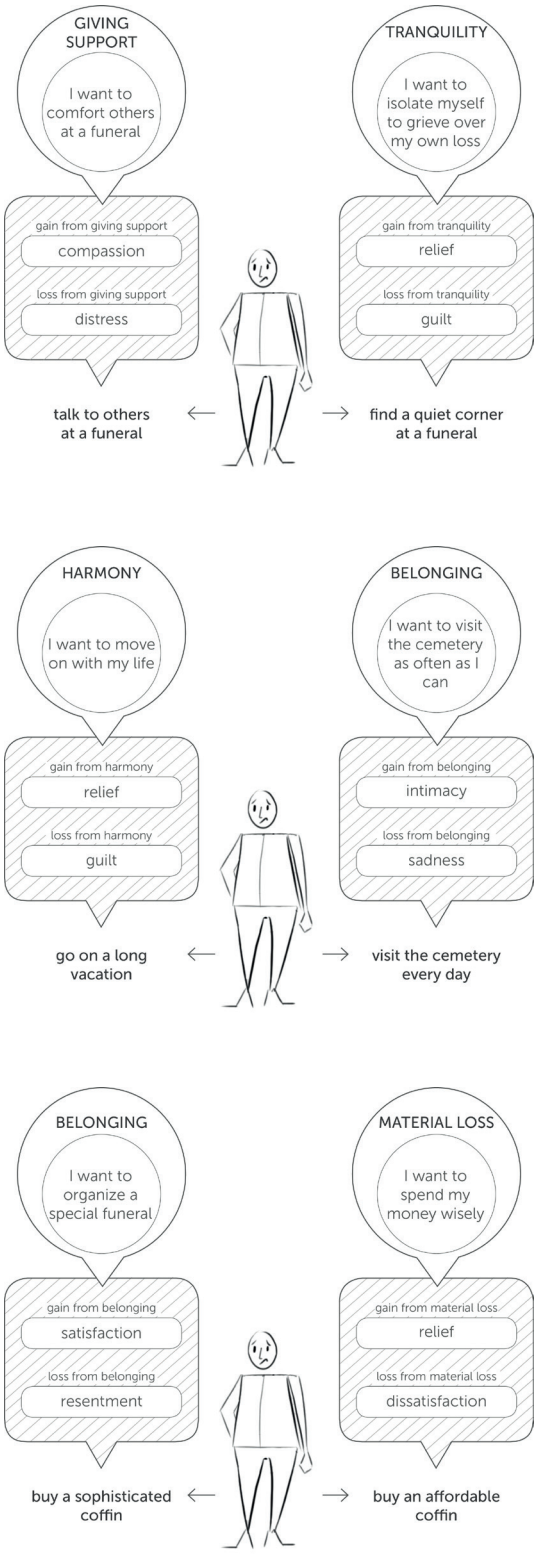


Figure 3.11 (a, b, c). Dilemma frameworks illustrating the selected dilemmas by the three teams

Data collection and analysis

We collected data using multiple sources such as weekly discussions, design reports, and the final outcome. The first author was involved in all case studies as an academic mentor, and recorded all design considerations that seemed relevant for selecting a target dilemma. These considerations included both the qualities explicitly mentioned and the observations of the supervisory team. In addition, we conducted a focus group with the designers of the graduation projects, in which we presented them with dilemmas identified in each project in the format of cards. To initiate the discussion, we asked each designer to order the dilemmas identified in each project from the most to the least interesting. Similarly, we asked the designers who participated in the workshops (fourth case study) to examine and indicate the most interesting dilemma identified by other teams. The considerations they had when selecting among the dilemmas were discussed in a follow-up group discussion.

Prior to data analysis, the first author fully transcribed the focus group conducted with the designers of the graduation projects. All quotes and observations gathered during the workshop were added to the transcript. Next, the first author created a long list of considerations relevant for selecting a dilemma (see appendix). Finally, the authors systematically compared case-specific considerations across cases by asking, *'how do the considerations in these two cases (e.g., case 1 and 2, case 1 and 3, and so on) differ from each other?'* (see Eisenhardt, 1989). The similarities and differences between these considerations yielded cross-case patterns, which were categorized under three main themes that emerged from the data.

Results: Key qualities of a design-worthy dilemma

Six to eight dilemmas were identified in each case study, with the exception of the fourth case study (design workshop), in which the designers were asked to formulate only three dilemmas. The designers could not rely on predetermined criteria for choosing among these dilemmas. As a consequence, they had to rely on a more intuitive selection process. In this process, their supervisors encouraged them to ask themselves the following question: *'when imagining this dilemma, can I already envision some design ideas or directions?'* The idea was that a suitable dilemma inspires the designer and opens up a design space. This intuitive approach could eliminate several dilemmas. When in doubt between the remaining two or three dilemmas, the designers

tried exploring existing products or creating design ideas for each dilemma and letting the quality of their ideas guide their decision on a target dilemma. There was consensus among designers when they rated the dilemmas as the most/least interesting. For instance, the designers of the graduation projects evaluated the dilemmas identified by each other and, independently of each other's responses, chose the same dilemmas as the most interesting.

Although selecting a design-worthy dilemma seems to be specific to each design brief, common considerations could be observed across cases. We categorized these common considerations under three main themes, namely *Relevance, Inspiration,* and *Meaningful Formulation.* Table 3.6 summarizes our findings.

Table 3.6. Three main themes covering the seven key qualities of a design-worthy dilemma

Main theme	No	Key qualities of a design-worthy dilemma	Corresponding case study
Relevance	1	Addresses the key challenge given in the design brief	1, 2, 3, 4
	2	Applies to the majority of potential users	1, 2, 3, 4
	3	Has direct impact on the subjective well-being of potential users	1, 2, 3, 4
Inspiration	4	Is one in which products, or design in general, might play a role	2, 3, 4
	5	Involves surprising elements or unexpected concerns	3, 4
Meaningful formulation	6	Seldom involves strictly opposing choice alternatives	1, 2, 4
	7	Is abstract enough to be inspiring, but also concrete enough to give direction or contextual information	2, 3

Relevance of a dilemma is related to its capacity to address the key challenge in the design brief (first quality in Table 3.6). For instance, the first dilemma in the third case study (wanting to be informed about developments in one's neighborhood vs. not wanting to read complex information) was considered the least relevant dilemma for the given design brief because, in the words of the designer, "this dilemma is too general, I think, you can say this [people avoid complex information] about a lot of things. It does not capture the authenticity of the topic at hand." In addition, dilemmas that were encountered few times during context research were considered less influential than dilemmas that were mentioned frequently. For example, the second dilemma of the

second case study (expressing feelings at work vs. maintaining a sense of belonging) was disregarded because it was specific to one research participant (second quality in Table 3.6). In contrast, in the third case study, the majority of participants expressed a conflict between maintaining the local identity of their neighborhood and desiring independence from large energy producers. Therefore, addressing this dilemma was anticipated to have a large impact on the wellbeing of citizens. Finally, dilemmas that were directly related to future users were prioritized over dilemmas that were related to peripheral user groups (third quality in Table 3.6). For example, the parents' dilemma in the first case study was disregarded because addressing parents' dilemmas was considered to have only an indirect impact on the mind-set of able-bodied children.

Inspiring dilemmas are those that afford meaningful translation to design interventions. The designer in the second case study defined an inspiring dilemma as follows: "I immediately see some forms, and some design solutions for this dilemma. It does not have to be an actual design idea, but a feeling of knowing how to tackle it." Involvement of products in a dilemma made it easier to envision design interventions that could address this dilemma (fourth quality in Table 3.6). For example, designers carrying out the fourth case study focused on redesigning gravestones, coffins, or flower bouquets, which were part of the cemetery context. In contrast, anticipating the role of design for addressing dilemmas identified in the second case study (i.e., dealing with conflicting life-goals) was a challenge since many dilemmas were related to mental wellbeing in which products played an undefined or limited role. In addition, dilemmas that involved surprising elements or unexpected concerns were considered to be more inspiring compared to dilemmas that involved obvious user concerns (fifth quality in Table 3.6). For example, the second team of the fourth case study was inspired by the conflict between the concern for individuality (i.e., moving on with my life) and the concern for belonging (i.e., visiting the cemetery everyday), because they were surprised to find out that a person would strive to visit a cemetery everyday after losing a loved one.

Meaningful formulation of a dilemma can enhance the design space provided by that dilemma. For instance, dilemmas that were formulated in terms of strictly opposing choices (e.g., attend a funeral vs. do not attend a funeral) were considered to constrain

the solution space compared to dilemmas that were formulated in terms of mutually exclusive choices (e.g., remain quiet at a funeral vs. comfort others at a funeral) (sixth quality in Table 3.6). Moreover, reformulation of concern statements at varying abstraction levels might enhance the design-worthiness of a dilemma. Concrete formulations often involve contextual details that make them immediately actionable in ideation, whereas abstract formulations lead to more original ideas due to their general, context-independent nature (Ward, Patterson, & Sifonis, 2004). In other words, formulating the dilemma in a concrete manner (e.g., supporting a local wind-farm vs. opposing it) offers concrete contextual information; however, it limits the solution space to a single context (e.g., voting for wind-farms). Alternatively, formulating the dilemma in an abstract manner (e.g., autonomy vs. security) offers a larger solution space; however, this formulation might be considered too general to inform design decisions in ideation. As both abstract and concrete formulations have benefits (and limitations), exploring their nuances can enable new, and possibly more design-worthy, interpretations of a dilemma (seventh quality in Table 3.6).

Discussion

The key qualities proposed in Table 3.6 are intended to facilitate introspection and discussion when framing an appropriate problem space. In ill-structured problem solving, framing involves identifying divergent perspectives, collecting evidence that support or refute alternative problem definitions, and thereby, forming an understanding of the problem situation (Jonassen, 1997). These design activities are in line with the constructivist perspective on problem framing suggested by Schön (1991). According to this perspective, problem framing is guided by a series of thought experiments triggered by the question, "What if I did *this*?" (Schön, 1984, p.132). In dilemma-driven design, identifying dilemmas (i.e., discovery) and selecting a target dilemma (i.e., definition) can be considered as acts of problem framing. When engaging in these activities, the designers did not have any pre-defined criteria as input for selecting a dilemma. Therefore, they often chose a target dilemma through iteratively creating ideas for several dilemmas, and letting the quality of the ideas and the support of the project mentors guide them to a target dilemma. This process lasted, on average, three weeks. The proposed qualities explicate the considerations designers had when selecting target dilemmas. Therefore, when implemented, they can facilitate the reflective

conversation with the problem situation as suggested by Schön (1991). For instance, dilemmas that include surprising elements were considered more inspiring (Table 3.6). This is in line with the idea that surprising, unexpected events encountered during the design process represent the "backtalk" of a situation, enabling new interpretations and intentions (Schön, 1991). Moreover, the proposed qualities can create valid discussion points with involved stakeholders, such as the client or design experts. This is important because the involvement of a client with a specific product portfolio or branding strategy can greatly influence the choice of a target dilemma (Ozkaramanli et al., 2013). In short, the qualities in Table 3.6 are not intended as a checklist or a conclusive measure of design-worthy dilemmas, rather as tools for introspection and discussion that can inform design decisions and possibly reduce the time required for selecting a promising dilemma.

A less apparent question is; why select *one* dilemma? The diversity of the identified dilemmas indicates that choosing one dilemma to guide further design efforts might help communicating the essence of future design ideas. Nevertheless, selecting a dilemma can still occur after generating design ideas for a small group of dilemmas. For example, in the second and the third case studies, the designers first created ideas for a group of two to three dilemmas; and they let their initial design ideas guide their choice on a target dilemma. Selecting a dilemma, generating ideas to address it, and consequently, rejecting or moving on with it are activities that align with the co-evolution of the problem and the solution space (e.g., Dorst & Cross, 2001). Each new dilemma gives clues about a different aspect of the problem, and iteratively exploring several dilemmas can help better understanding the problem and simplifying it until "the feeling of having grasped the core of the problem" is reached (Dorst & Cross, 2001, pp. 13-14). Note that the manner in which the problem space is initially framed might have an influence on the effectiveness of the iterations. For instance, the design contexts for the first and the fourth case studies were specified (play activities and cemetery/funeral, respectively), while the second and the third case study dealt with broad design domains (i.e., stress and wind-farm implementation). As a result, the latter cases required longer explorations and involved more uncertainty when framing a viable problem space compared to the other cases.

When selecting a target dilemma, designers can rely on research findings as well as their intuition. The graduation projects (first,

second, and third case studies) involved an extensive phase of context research (e.g., interviews, internet search, literature review). Having thoroughly researched the topic, selecting a design-worthy dilemma for the graduation projects was mainly driven by "what the users said". For instance, the designer of the third case study (Look-out Point) used Vision in Product Design approach (ViP) of Hekkert and van Dijk (2011) to form an overview of the key factors (political, technological, psychological, economic and so on) that might play a role in wind-farm implementation. Through analyzing these factors, she identified the dilemmas of specific users as well as interpreting a deeper concern for "no change in my way of living". This interpretation aligned the insights from the user-specific dilemmas with the holistic understanding she synthesized about the wind-farm problem. Similarly, the ECC procedure used in the first case study (Uniekies Game) requires a certain level of interpretation when analyzing the conflicting relationships among user concerns. In this way, it supports identifying design-worthy dilemmas using both user-driven insights and designer-driven interpretations. In other words, relying exclusively on users' self-reports to guide the selection of a target dilemma might constrain designers' freedom to interpret these findings in a way that helps structuring the problem. Alternatively, the participants of the design workshop (fourth case study) relied on expertise and personal experience for selecting a design-worthy dilemma, in which they had the freedom to formulate dilemmas that they considered design-worthy. However, these formulations might risk relevance for users. As a result, we suggest that selecting a design-worthy dilemma is a decision that should align the main insights from the research findings with the interpretations of the designer.

Meaningful formulation of dilemmas (Table 3.6) indicates that a dilemma can be reformulated at varying abstraction levels to increase its design worthiness. In other words, design-worthiness is not an invariable characteristic that dilemmas inherit. Formulating conflicting concerns at different abstraction levels yields alternative dilemma representations, which can enhance the design value of a dilemma. Abstract formulations encourage imagining higher number of design solutions, yet they require higher mental effort as they lack contextual information to facilitate designers' imagination (Ward, Patterson, & Sifonis, 2004). Alternatively, concrete formulations include imaginable physical references (e.g., specific products, activities, environments), yet they often limit the design solutions to the context of these

references (Ward, Patterson, & Sifonis, 2004). The framework of dilemmas (see Figure 3.1) structures a dilemma in varying abstraction levels, ranging from concrete choices to abstract motivations. In this way, it can facilitate exploring the benefits and limitations of abstract and concrete formulations, and consequently, formulating a design-worthy dilemma.

Finally, the limitations of the case studies should be mentioned. Dilemmas are mental phenomena that can be challenging to identify through self-report. Translating research goals into simple and concise questions that are understandable by users requires knowledge of abstract and complex human principles (e.g., emotions, concerns, and concern conflicts) as well as expertise in interviewing. The designers who carried out the case studies had limited expertise in interviewing, which might have influenced the quality of the identified dilemmas. In addition, the case study approach has often been criticized for not yielding generalizable results (Yin, 1984). However, the search for generalization might overshadow the main contribution of case studies, which is the exemplary knowledge they generate based on the uniqueness of each case and the expert interpretations of those who structurally reflect on the case studies (Thomas, 2010). As a result, the proposed qualities should not be viewed as conclusive criteria on the design-worthiness of a particular dilemma; rather as an embedded narrative that might connect interpretations of the case studies in this paper with a new situation.

Conclusion

The purpose of this paper was to elaborate the stages of designing with dilemmas and to address a key challenge in this process, which is the selection of a target dilemma as a means to frame an appropriate problem space. By analyzing cross-case patterns in designers' considerations, we identified seven key qualities of design-worthy dilemmas and categorized them under three main themes (Table 3.6): (1) *relevance,* the impact of addressing a dilemma on future users, (2) *inspiration,* the selected dilemma's potential to inspire design ideas, and (3) *meaningful formulation,* the effort to reformulate dilemmas at varying abstraction levels to form an advantageous design space. The first quality suggests that selecting a design-worthy dilemma requires both an understanding of users' needs and interpretation of these needs based on domain-specific knowledge and design expertise. The second quality suggests that design-oriented or surprising dilemmas

might be entry-points into a reflective conversation with the design task, as suggested by Schön (1991). And the third quality suggests that design-worthiness is not an inherited advantage, rather a quality that can be enhanced through reformulation of dilemmas in abstract or concrete ways. These qualities can facilitate introspection and discussion when framing a viable problem space using dilemmas. Because of this, they have implications in fields that often implicitly address dilemmas, such as design for subjective wellbeing and design for behavior change. In addition, the case study approach is a useful approach when researching complex and situated problems, such as dilemmas. In this paper, all case studies followed the dilemma-driven design activities (i.e., discovery, definition, and application), which also created the opportunity to compare how this approach would work for different design briefs.

Appendix

Table 3.7 lists the considerations mentioned when selecting a target dilemma across different cases. Each consideration is supported by example quotes from the designers.

Table 3.7. Designers' considerations mentioned when selecting a target dilemma with example quotes

Consideration The selected dilemma:	Corresponding case study	Example quote
Has a big impact on the (psychological) wellbeing of users	1, 2, 3, and 4	*I see tackling this dilemma as an opportunity to change things because this is the main problem; this is what burdens people the most.*
Has potency, i.e., relevance for many users	1, 2, 3, and 4	*Preserving local identity of one's neighborhood applies to all people, and always (case study 3). It is innate to people to protect their own territory; the place they are attached to.*
Involves clearly conflicting, yet distinct concerns	1, 2, and 3	*These are two different concerns, but they are clearly opposing each other: Explore fun challenges or let everyone play along (case study 1). I can really feel the tension.*
Does not involve opposing choices	4	*This dilemma is too strict: I want to do something, but actually I don't. It does not lead anywhere.*
Involves opportunities for design	4	*These dilemmas already involve some products (e.g., a flower bouquet, a coffin) (case study 4), which already hint some design ideas.*
Triggers ideas when I [the designer] think about it	2 and 3	*I immediately see some forms, and some design solutions with this dilemma, but not with the others. It does not have to be an actual idea, but a feeling of knowing how to tackle it.*
Is a surprising (not an obvious) dilemma	3 and 4	*Design opportunities focused on concerns related to this dilemma [local identity of a neighborhood] (case study 3) have been explored far less in this field.*
Is not triggered by lack of personal resources, such as time and money	2	*Everyone wants to have more time and money. Thus, I do not like dilemmas about these factors, because their solutions seem obvious.*
Is a recurring dilemma	2 and 4	*In the end, I chose the dilemma about the work situation (case study 2), because it is a frequent problem and it would be nice to design for.*
Is a dilemma that I [the designer] can relate to	2	*I had a very difficult time here. I can relate to all of these dilemmas - they could all be interesting to design for.*

Consideration The selected dilemma:	Corresponding case study	Example quote
Is authentic, applies specifically to the design brief at hand	1 and 3	*The dilemma about 'information on new windmill policies should be easily understandable' (case study 3) is too general. You can say that about a lot of things. It is not specific to this topic.*
Involves behavioral choices, because behaviors involve different factors	2 and 3	*Behavioral dilemmas are more interesting because human behavior is rich and complex. It is influenced by many different factors that can help me come up with ideas.*
Directly influences the target group, the effectiveness of the solution does not depend on other people	1 and 3	*This dilemma is dependent on other people - meaning the solution is dependent on other people, so it will be harder to design for.*
Involves significant user goals	3 and 4	*A dilemma, such as whether to drink coffee or tea in the morning, sounds too small, too specific, or too personal. It would not be worth designing a product for.*
Is a personal dilemma, not a dilemma between two people	1 and 3	*It is less interesting to have a dilemma between two people - it seems too black and white. I feel like designing with it would be imposing the needs of one person on the other.*
Is the dilemma resolution of which goes beyond solving a problem, it can add something positive to people's lives	1 and 3	*Dilemmas that focus too much on negative aspects of a situation (e.g., noise, sight, disturbance of windmills) (case study 3) are less inspiring. I want people to see the positive side of things. That's the real challenge.*
Is a flexible conflict from which new meanings can be derived	2 and 3	*I did not want to be redesigning windmills in this project (case study 3), but when users mention a product related to the dilemma, it is hard to imagine another product to address that dilemma.*

References

Bins, W. (2014). *Better Safe than Sorry! A Design Intervention that Triggers People to Reflect on Continuous Spatial Changes with an Emphasis on Local Wind-Farm Implementation.* Master thesis. Delft University of Technology, Delft, The Netherlands.

Buijs, J. (2003). Modeling product innovation processes, from linear logic to circular chaos. *Creativity and Innovation Management, 12*(2), 76–93.

Coehoorn, M. (2014). *Phubbing? An Absurd Design Intervention for Redefining Smart-Phone Usage.* Master thesis. Delft University of Technology, Delft, The Netherlands.

Desmet, P. M. A., & Pohlmeyer, A. E. (2013). Positive design: An introduction to design for subjective well-being. *International Journal of Design, 7*(3), 5¬–19.

Dorst, K., & Cross, N. (2001). Creativity in the design process: Co-evolution of problem–solution. *Design Studies, 22*(5), 425–437.

Dunne, A., & Raby, F. (2013). *Speculative Everything: Design, Fiction, and Social Dreaming.* MIT Press: Cambridge.

Eisenhardt, K. M. (1989). Building theories from case study research. *Academy of Management Review, 14*(4), 532–550.

Ford, M. E. (1992). *Motivating Humans: Goals, Emotions, and Personal Agency Beliefs.* Sage Publications: California.

Frijda, N. H. (1988). The laws of emotion. *American Psychologist, 43*(5), 349–358.

Hekkert, P., & van Dijk, M. (2011). *ViP-Vision in Design: A Guidebook for Innovators.* BIS Publishers: Amsterdam.

Innemee, J. (2014). *Uniekies Game: Changing a Child's Mindset towards Children with Disabilities.* Master thesis. Delft University of Technology, Delft, The Netherlands.

Jonassen, D. H. (1997). Instructional design models for well-structured and ill-structured problem-solving learning outcomes. *Educational Technology Research and Development, 45*(1), 65–94.

Jonassen, D. H. (2000). Toward a design theory of problem solving. *Educational Technology Research and Development, 48*(4), 63–85.

Lockton, D., Harrison, D., & Stanton, N. A. (2010). The Design with Intent Method: A design tool for influencing user behavior. *Applied Ergonomics, 41*(3), 382–392.

Ozkaramanli, D. & Desmet, P. M. A. (2012). I know I shouldn't yet I did it again! Emotion-driven design as a means to subjective wellbeing. *International Journal of Design, 6*(1), 27–39.

Ozkaramanli, D., Fokkinga, S. F., Desmet, P. M. A., Balkan, E., & George, E. (2013). Recreating AlaTurca; consumer goal conflicts as a creative driver for innovation. In D.S. Fellows (Ed.), Brilliant Transformations: *Proceedings of Qualitative Research 2013,* Valencia, 17-19 November. Amsterdam (NL): ESOMAR.

Ozkaramanli, D., Özcan, E.; & Desmet, P. M. A. (2014). Capturing conflict experiences: Five methods for identifying intra-personal concern conflicts. In J. Salamanca, P. M. A. Desmet, A. Burbano, G. Ludden and J. Maya (Eds.), The Colors of Care: *Proceedings of the 9th International Conference on Design and Emotion,* Bogotá, Colombia, 6-10 October. Bogotá: Ediciones Uniandes.

Ozkaramanli, D., Desmet, P. M. A., & Özcan, E. (2016). Beyond Resolving Dilemmas: Three Design Directions for Addressing Intrapersonal Concern Conflicts. *Design Issues, 32*(3), 78–91.

Reynolds, T. J., & Gutman, J. (1988). Laddering theory, method, analysis, and interpretation. *Journal of Advertising Research, 2*, 11–31.

Roozenburg, N. F., & Eekels, J. (1995). *Product Design: Fundamentals and Methods, (Vol. 2).* Chichester: Wiley.

Schön, D. (1984). Problems, frames and perspectives on designing. *Design Studies, 5*(3), 132–136.

Schön, D. (1991). *The Reflective Practitioner: How Professionals Think in Action.* Basic Books.

Simon, H. A. (1969). *The Sciences of the Artificial.* Cambridge, MA.

Simon, H. A. (1973). The structure of ill structured problems. *Artificial Intelligence, 4*(3-4), 181–201.

Thomas, G. (2010). Doing case study: Abduction not induction, phronesis not theory. *Qualitative Inquiry, 16*(7), 575–582.

Thomas, G. (2011). A typology for the case study in social science following a review of definition, discourse, and structure. *Qualitative Inquiry, 17*(6), 511–521.

Tromp, N. (2013). *Social Design.* Unpublished doctoral dissertation. Delft University of Technology, Delft, The Netherlands.

Ward, T. B., Patterson, M. J., & Sifonis, C. M. (2004). The role of specificity and abstraction in creative idea generation. *Creativity Research Journal, 16*(1), 1–9.

Yin, R. K. (1984). The case study crisis: Some answers. *Administrative Science Quarterly, 26*(1), 58–65.

[i] The Uniekies Game was the outcome of Janine Innemee's graduation project at Delft University of Technology, supervised by dr. Mathieu Gielen (chair person), Deger Ozkaramanli (academic mentor), Joris Swaak (company mentor), and Ingeborg Griffioen (company mentor). This project was conducted in collaboration with Panton, a design office focused on health care; and NSGK, a foundation that aims to support the development of children with disabilities in the Netherlands.

[ii] The Attention Seeker was the outcome of Marit Coehoorn's graduation project at Delft University of Technology, supervised by Prof. Dr. Paul Hekkert (chair person), Deger Ozkaramanli (academic mentor), and Linda Bolier (company mentor). This project was conducted in collaboration with Trimbos Institute, a mental-health organization that aims to support mental wellbeing.

[iii] The Look-out Point was the outcome of Willemijn Bin's graduation project at Delft University of Technology, supervised by Prof. Dr. Pieter Desmet (chair person), Dr. Renee Wever (chair person), Deger Ozkaramanli (academic mentor), and Simone Maase (company mentor). This project was conducted in collaboration with Energie-U, a non-profit energy cooperative that aims to locally produce and harvest solar and wind energy.

[iv] Co-exploration is a procedure in which members of a design team collaboratively formulate hypothetical dilemmas in a given design domain using personal experience and domain expertise (Ozkaramanli, Özcan, & Desmet, 2014).

[v] The concern titles in these statements (e.g., fun or competence) are based on the universal goal taxonomy of Ford (1992), which gives a comprehensive yet compact overview of universal motivations underlying most human concerns.

[vi] Design by Matthew McClumpha, Nienke van der Straten, Rochelle Simons, and Rosanne Martens, 2015. Illustration of the design concept by Freya Ruijs.

[vii] Design by Sofia Hnatiuk, Rozemarijn Klein Heerenbrink, Bob van Iersel, and Jaap Meijer, 2015. Illustration of the design concept by Freya Ruijs.

[viii] Design by Michèle Stoop, Laura Gonzalez Osorio, Otmar Balk, and Rowan Ton, 2015. Illustration of the design concept by Freya Ruijs.

PART B

Designing with Dilemmas

"But fortunately, and unfortunately, the other thing we know is that pleasure, like happiness, is not as simple a thing as we would like it to be: ... as a child my pleasure in pleasing my parents and my teachers can outstrip my pleasure in schoolwork, so I sacrifice my genuine interests for the love and approval of the grown-ups. Some pleasures don't make us happy, and some pains do."

- Adam Phillips, On Balance, p. 86

The first part of this thesis (Part A) offered an understanding of personal dilemmas and the different directions with which designers can respond to users' dilemmas (Study 1, Chapter 2). In addition, the seven key qualities of design-worthy dilemmas have been discussed based on cross-comparison of four dilemma-driven design cases (Study 2, Chapter 3). As a result, chapters in Part A have answered the first and second research questions in Table 1.1.

One of the main aims of this thesis is to facilitate the integration of dilemmas in conceptual design activities, particularly when framing design problems (i.e., analysis) and generating design ideas (i.e., synthesis). In Chapters 4 to 6, the design directions proposed in Chapter 2 (i.e., resolving, moderating, and triggering dilemmas) will be elaborated with an increased emphasis on problem framing and ideation.

Chapter 4 focuses on resolving dilemmas. It addresses the third and fourth research questions in Table 1.1, which are *what are suitable criteria for framing concerns in a dilemma?* And *what design strategies can facilitate ideation when resolving dilemmas?* For this, a large-scale industry project has been reported (Study 3) followed by a design brief completed by sixty novice designers (Study 4). These studies reveal the challenges and opportunities of consciously navigating various abstraction levels when framing concerns, and four design strategies that can be used when generating ideas to resolve dilemmas.

PART B

Designing with Dilemmas

Chapter 5 focuses on moderating dilemmas, and it addresses the fifth research question in Table 1.1, which is *what strategies can facilitate ideation when addressing self-control dilemmas?* Based on phenomenological interviewing, a framework for dilemmas and three design strategies have been suggested (Study 5). The framework of dilemmas reveals the main ingredients of a dilemma (i.e., conflicting concerns, mixed emotions, mutually exclusive choices), and the design strategies support prioritizing long-term goals over immediate desires when addressing self-control dilemmas through design.

Chapter 6 focuses on triggering dilemmas, and it addresses the sixth research question in Table 1.1, which is *what strategies can facilitate ideation when triggering dilemmas?* Based on an analysis of existing products followed by an expert evaluation (Study 6), three preliminary design strategies have been suggested for triggering dilemmas through design.

CHAPTER 4

From teatime cookies to rain-pants: Resolving personal dilemmas through design using three levels of concern conflicts

This chapter is entirely based on the following journal article: Ozkaramanli, D., Desmet, P.M.A., & Özcan, E. (Submitted). From teatime cookies to rain-pants: Resolving personal dilemmas through design using three levels of concern conflicts. *International Journal of Design Creativity and Innovation*.[1]

Abstract

Design can resolve personal dilemmas through simultaneously fulfilling conflicting personal concerns. This paper proposes three abstraction levels for framing concerns when formulating personal dilemmas. In a large-scale industry project, we identified that dilemmas can be formulated and resolved at different abstraction levels, which leads to variety in design output. Based on these preliminary findings, we developed a structured way to formulate dilemmas using product-, activity-, and identity-focused concerns, where product-focused concerns are the most concrete level and identity-focused concerns are the most abstract level. Sixty master-level design students were asked to formulate a dilemma evoked by a product of their own choice and to create design ideas to resolve this dilemma. The results showed that dilemmas at all three levels of abstraction can be an input for ideation, with the 'most abstract yet still informative' concern combination being the most inspiring dilemma. In addition, we found that design can resolve dilemmas in several distinct ways, where each strategy comes with opportunities and challenges. Consciously formulating and examining alternative dilemma representations can create opportunities that might otherwise not be considered as input for ideation.

Keywords: emotion; idea generation; design methodology; problem solving; design synthesis

1 This chapter is entirely based on the stated journal article without any modifications to its content. The style and formatting of the article have been modified to match the visual style of the thesis, and references to other thesis chapters have been added where appropriate.

Introduction

Design traditionally aims to increase our quality of life by removing barriers to our efficiency and comfort, and by enhancing our everyday experiences. A potent way to achieve this is through resolving personal dilemmas (see Ozkaramanli, Desmet, & Özcan, 2016; Chapter 2 of this thesis). Dilemmas can be defined as the realization that one cannot have two desirable alternatives at the same time, such as packing a light suitcase (comfort) vs. packing a variety of outfits (being prepared for unexpected occasions). In this situation, the conflict between *comfort* and *being prepared* necessitates a compromise (e.g., I will bring an extra pair of shoes but leave my stylish handbag at home). Design can resolve this compromise by reconciling the conflicting desires. The stylish yet foldable handbag shown in Figure 4.1 enables one to travel light without having to leave a stylish handbag behind. In this way, design can offer product alternatives that are more user-appropriate and emotionally satisfying than products that necessitate a compromise.

Figure 4.1. Foldable handbag (photo by the first author)

Dilemmas always involve conflicts among personal concerns, such as traveling comfortably (i.e., packing light) vs. being well prepared (i.e., packing various outfits). These conflicts can be important triggers for design creativity, because they challenge the designer to envision novel scenarios in which the conflict is resolved (Ozkaramanli & Desmet, 2012; see also Benack, Basseches, & Swan, 1989). A well-known design method that demonstrates the creativity-enhancing nature of conflicts is TRIZ developed by Altshuller (1988). TRIZ focuses on formulating, analyzing, and resolving technical conflicts in a system (e.g., the

conflict between increasing the weight of an object without increasing the energy required to move it) by applying forty conflict-eliminating principles (Moehrle, 2005). In addition, Cross (2003) stated that a characteristic of exceptional designers is this ability to utilize conflicts between the features of an object and the user's requirements to come up with creative ideas. Moreover, the ability to tolerate intrapersonal conflicts has been suggested as an important determinant of creativity (Sheldon, 1995). Similarly the ability to tolerate ambiguity (i.e., a cognitive conflict experienced when making sense of objects and situations) enables designers to be more creative and productive (De Jong & Özcan, 2016).

Dilemma-driven design requires an understanding of users' concerns and concern conflicts. This understanding is often achieved through user research. A challenge in researching dilemmas is that people are generally not able to articulate their personal dilemmas on the level of concerns, because concerns are latent phenomena (e.g., Kleiman & Hassin, 2011). Instead, they tend to express dilemmas in terms of the concrete choice alternatives: Should I go for a morning run or sleep in? Should I buy a new dress or save money for a nice summer holiday? We argue that, despite being informative, these choices only provide a partial understanding of users' dilemmas. An opportunity here is to search beyond these concrete choices in order to identify the qualities of concerns that underlie each choice. For instance, asking the participant why it is important to go for a morning run might reveal that this choice is driven by a general concern for being energetic, while sleeping in might be driven by the concern for comfort or relaxation (see laddering interview techniques, Reynolds & Gutman, 1988). Actively searching for motivations underlying users' choices enables us to reformulate users' dilemmas at different abstraction levels as input for idea generation.

In this paper, we propose 'three levels of personal dilemmas' for examining the nuances among abstract and concrete dilemma formulations that can enable new interpretations of a dilemma, and consequently, creation of new design ideas inspired by these interpretations. Concrete formulations (e.g., "I want to go for a morning run") often involve rather tangible references, such as time, location, or physical features, which makes them easy to imagine and describe (Wiemer-Hastings & Xu, 2005). On the other hand, abstract formulations (e.g., "I want to be energetic") are intangible in

nature and they lack well-defined physical references and persisting existence in a specific context, which makes them harder to imagine and describe (Wiemer-Hastings & Xu, 2005). Ward, Patterson, and Sifonis (2004) suggest that abstract problem formulations (e.g., design an animal that can survive in outer space) allow for more originality due to their general nature. Alternatively, concrete formulations (e.g., adapt a cow to enable it to survive in outer space) offer other advantages, such as ease of cognitive processing in ideation or design advances that result in more familiar and acceptable products (Ward, Patterson, and Sifonis, 2004). As both abstract and concrete formulations have their benefits (and limitations), it might be helpful to understand and exercise with the nuances of these formulations in concern framing in order to discover inspiring dilemmas as input for ideation.

This paper consists of four main sections. In the first section, we briefly report a large-scale industry project in the domain of food design. In this project, the design team intuitively explored the nuances between abstract and concrete dilemma formulations and used these formulations as input for developing teatime snack concepts. In the second section, we define the three levels of personal dilemmas based on a post-hoc analysis of the findings of the teatime project. The third section reports a study in which sixty master-level design students used the proposed levels for creating dilemma-resolving design ideas. This study revealed the prominent abstraction levels that the students used when formulating design-relevant dilemmas and four design strategies that that can complement these levels in idea generation. Furthermore, the results are discussed in terms of the benefits and limitations of using the three levels of personal dilemmas. Finally, we conclude with a general discussion on the contribution of dilemma-driven design to other approaches on creative problem solving.

Dilemmas during teatime

The first and second author were involved in a large-scale industry project in which dilemmas experienced during an afternoon tea ritual were taken as a starting point to develop new teatime snack concepts for a specific target group (Ozkaramanli et al., 2013). The occasion and the target group for this project were determined by the company who consulted our research group for an emotion-based understanding of their target users. Sixteen people were visited for three to six hours during their afternoon tea ritual with friends. The research team

identified the main concerns and concern conflicts of target users using a protocol called Emotion Capture Card (ECC) procedure (see Ozkaramanli et al., 2013), which is a hybrid method that combines observation, interviewing, and experience sampling.

During the ECC procedure, the participants were asked to explain their emotions, which were captured at pre-defined intervals during teatime, using a laddering type interview technique. This yielded both concrete concerns that were related to the context of use (e.g., "I want to serve variety of snacks for my guests") and abstract user concerns (e.g., "I want to be a good mother"). These concerns were compared and contrasted to identify users' dilemmas. Table 4.1 outlines the main identified dilemmas and the descriptions of the resulting dilemma-inspired designs (for images of the designs, see Figure 4.2).

Some of the dilemmas that the host experienced were specific to the teatime context and had a pragmatic quality. For example, the host wanted to serve self-made food as a sign of her love and respect for her guests. At the same time, she struggled to offer enough variety to please everybody. This dilemma, mainly triggered by limited preparation time, offered an opportunity to develop packaged snack alternatives that look (and feel) homemade. In addition, some dilemmas were embedded in personal and cultural values. For example, the researchers repeatedly observed a general tension between the desire to keep up to date with new trends and developments, and the security of maintaining traditional tastes and values. This dilemma had implications for teatime: while wanting to try new, international recipes for the occasion, the hosts feared that their guests would appreciate traditional, well-known tastes better. The same dilemma seemed relevant for activities in other life domains as well, such as educating children (e.g., "I want my children to develop the skills necessary to succeed in a changing world" vs. "I want my children to do things in the traditional way").

Table 4.1. Summary of dilemmas experienced by target consumers during teatime

Dilemma title and explanation	Design output
Serving self-made food vs. offering variety *I want to serve a variety of snacks, including sweet and savory, but at the same time, I feel that I have to prepare them myself to ensure their quality.*	Packaged food products that look and taste homemade to increase the variety of snacks served. (See Figure 4.2a)
Being a proud host vs. being a comfortable host *I feel pressure to perform as a host; I don't want to make mistakes and I want to be sure that my guests are happy and have all that they need. At the same time, I want to be relaxed so that my guests can relax as well.*	Brand website that communicates tips and suggestions to prepare for teatime.
Trying new environments vs. maintaining intimacy *I like trying different environments for hosting teatime. However, I also want my guests to feel safe, and I want to have an intimate atmosphere in which we can have intimate conversations. For this openness, I have to rely on the traditional routines.*	Brand website that offers discounts for organizing teatime in local patisseries.
Trying new recipes vs. anxiety to fail *I love trying new recipes and experimenting with my cooking. On the other hand, I don't want to fail the expectations of my guests. Therefore, I often use my familiar recipes.*	Brand website that suggests fail-proof recipes.
Being open to change vs. maintaining tradition *I want to maintain my traditional values and habits, and pass them onto my children. However, I also want to embrace change, especially for my children, since I want them to be self-sufficient and successful in an ever-changing world.*	Packaged food products that combine new, unexpected forms and flavors with traditional ones. (See Figure 4.2b) Brand identity that aligns modern forms, colors and patterns with traditional ones. (See Figure 4.2c)
Feeling special vs. being a responsible housewife *I want to feel like a special and unique person, but as a mother and wife, I feel that I should always put my family and friends before myself.*	Packaged food products that are flexible so that users can customize them according to their personal taste. (See Figure 4.2d)

In the design process, we experienced that it was fruitful to explore a dilemma at various levels of abstraction. In this project, the client chose the dilemma between "being open to change vs. maintaining traditional values" as the main design theme. Within this theme, a range of design ideas were created such as new product features, packaging ideas, brand identity, and communication strategies. Exploring abstract formulations of this dilemma enabled the design team to think beyond the teatime context, which resulted in communication strategies (e.g., a television advertisement that features the clash between a mother with firm, traditional values and her

Figure 4.2. From left to right (a) Imperfectly shaped crackers flavored with spices used in home-cooking, (b) packaged cake combining traditional forms with new flavors, (c) screenshot of the website communicating the brand identity by combining traditional colors and forms in a modern setting, (d) bite-sized, neutral-tasting cups that can be filled in with different ingredients to create unique tastes (photos by the first author)

rebellious daughter-in-law). Alternatively, concrete formulations of the same dilemma inspired new flavors for the snacks served during teatime (i.e., a combination of traditional flavors with surprising, new ingredients). As a result, consciously examining dilemma formulations at different abstraction levels could stimulate creation of new ideas, each with a distinct focus.

In addition, the design team used different strategies to resolve dilemmas. For instance, the design idea shown in Figure 4.2b combines sensorial information that embody the abstract concepts of tradition and being open to change. Here, historical forms were used to conceptualize the concept of tradition and unexpected flavors were used to embody the concept of being open to change. Alternatively, to resolve the dilemma between "I want to feel special" vs. "I want to be a responsible housewife", the design team developed edible, bite-sized cups (Figure 4.2d), which could be used to prepare fillings with unique flavors. The personalized nature of these snacks aimed to create a feeling of uniqueness, while their practical preparation could save time for other responsibilities. In summary, the different design approaches adopted in the teatime design case indicate that there might be an unexplored set of design strategies that can be used to resolve dilemmas.

Three levels of personal dilemmas

Insights derived from the teatime design case inspired developing three levels of personal dilemmas that can be used to create alternative representations of dilemmas at three abstraction levels. At the heart of a dilemma is a combination of two concerns (e.g., "I want to maintain my traditional values and habits" vs. "I want to be open to change"). Because conflicting concerns represent the raison d'etre of dilemmas, we use the term *dilemmas* and *conflicting concerns* interchangeably

and will take the formulation of concerns as a starting point for formulating dilemmas.[2]

Personal concerns can be product-, activity-, or identity-focused (Desmet, 2008). By their nature, these concerns appear to represent three different abstraction levels. Product-focused concerns focus on a quality of the product, such as a product attribute or benefit. "Teatime snacks should have a traditional taste", or "the product should help me to focus" are examples of product-focused concerns. This is the most concrete level, because the concerns involve perceivable product attributes or are embedded in specific contexts. In contrast, identity-focused concerns express a quality of the person, such as habits, personality traits, values, aspirations, or life goals. Examples are "I want to maintain my traditional values and habits" or "I want to have healthy eating habits". Personal qualities are often independent of the context of product use and might be applicable to various domains in the person's life. Therefore, identity-focused concerns are at the most abstract level. Activity-focused concerns are about a quality of the activity in relation to product use, such as an experience or a behavior. "I should meet the expectations of my guests during teatime" or "I want to follow my routine when preparing breakfast" are examples that describe activities a product might enable. As these concerns refer to the context of use, yet do not involve specific product attributes; they sit at a mid-abstraction level between product- and identity-focused concerns.[3]

It is often possible to formulate a concern at different abstractions level using techniques called laddering up (i.e., interpretation) and laddering down (i.e., instantiation) (Reynolds & Gutman, 1988). For example, a product-focused (concrete) concern, such as "I want to serve traditional snacks to my guests", might be reformulated to an identity-focused (abstract) concern, such as "I want to maintain my traditional values and habits". In this case, laddering up by asking *why*

2 The term dilemma refers to the holistic experience of a personal conflict where conflicting concerns are one ingredient, and where mutually exclusive choices (e.g., prepare a traditional dish vs. prepare an new, unfamiliar dish) and anticipated emotions evoked by each choice (e.g., relief and boredom vs. excitement and anxiety) are the other two ingredients. For a complete definition, see Chapter 5 of this thesis.

3 Note that, although identity-focused concerns tend to be abstract and product-focused concerns tend to be concrete, the focus of these concerns and the abstraction level are two different dimensions where the former involves discrete categories of content and the latter a gradual range. However, for purposes of this study, we will use these three foci (product, activity, identity) to represent concerns at three abstraction levels.

(e.g., why is it important to serve traditional snacks?) helps to identify the abstract concern behind a concrete choice. Similarly, laddering down by asking *how* (or what causes this?) helps to identify a specific product or an activity that can fulfill an abstract concern (see Manyiwa & Crawford, 2002). For example, "I want to experiment with new recipes for teatime" might be one instance of "I want to be open to new experiences". Note that the responses to 'why' questions ideally come from users themselves to avoid misinterpretation of their deeper goals and values by the design team. Therefore, this approach always requires a stage in which users' concerns are determined in a way similar to the ECC procedure used in the teatime project.

As it is possible to formulate a concern at three abstraction levels without losing its essence, it becomes possible to formulate conflicting concerns *within* and *across* any of these levels. This yields nine alternative pairs of conflicting concerns (i.e., dilemmas). The contribution of consciously formulating and examining these alternative dilemmas is that it can create problem definitions that might otherwise not be considered as an input for ideation. When resolving dilemmas, this might inspire variety of ideas ranging from very technical solutions (i.e., by using product-focused dilemmas) to very conceptual solutions (i.e., by using abstract dilemmas). As a result, a design team can choose to create ideas to address dilemmas at all of these abstraction levels, or choose one of them as an inspiring starting point for ideation.

Figure 4.3 shows three levels of personal dilemmas that illustrate how product-, activity-, and identity-focused concerns can be combined in nine different ways to obtain nine alternative dilemma representations. As an example, we used the dilemma "maintaining traditional values vs. being open to change". In Figure 4.3, combinations 1.1, 2.2 and 3.3 represent dilemmas formulated within the same abstraction level (i.e., product-product, activity-activity, identity-identity combinations, respectively), and the remaining numbers represent dilemmas formulated across different abstraction levels. Note that there are two representations for each cross-level combination, which are similar in concern type but differ in content. These combinations are product-activity (1.2) or activity-product (2.1); identity-product (3.1) or product-identity (1.3); and identity-activity (3.2) or activity-identity (2.3) combinations.

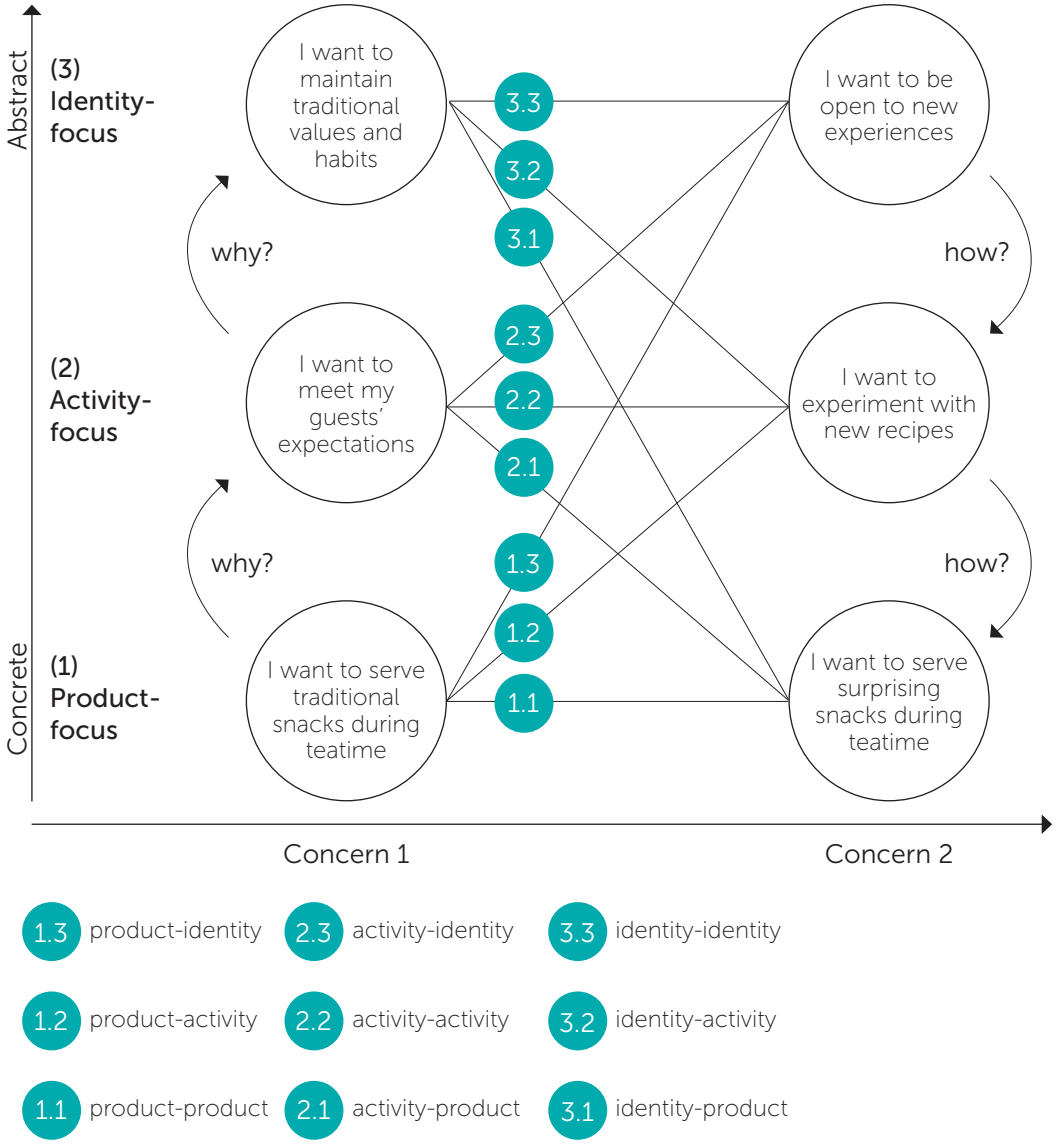


Figure 4.3. Graphical representation of the three levels of personal dilemmas that yields nine alternative dilemma formulations

Implementing the three levels of personal dilemmas and introducing design strategies

The design examples in the teatime design case were inspired by dilemmas; however, their design did not involve a structured way of examining conflicting concerns at varying abstraction levels. The design team intuitively formulated dilemmas to best capture the insights they gathered during user research. If the proposed levels of personal dilemmas were in fact utilized, it would have been interesting to know, for example, whether the dilemma formulations would be different, and whether some of the nine alternative representations would stand out as more popular than others. To better understand the contribution of the three levels of personal dilemmas to resolving concern conflicts, we implemented these levels in a design project completed by sixty novice designers.

Method

The main goal of this study was to understand how designers would adopt and adapt the three levels of personal dilemmas when redesigning a product to resolve a particular dilemma. Specifically, we focused on the following questions:

1. Formulating dilemmas: How do designers explore the three abstraction levels? What challenges do they encounter? Are some levels more popular than others?
2. Resolving dilemmas: What kind of design strategies do designers use when generating ideas to resolve dilemmas? Are some strategies more useful than others?

Sixty master-level student designers responded to our design brief as part of a course focused on product experiences. The designers identified a dilemma that a product they owned could evoke, and they proposed a redesign using the three abstraction levels as input for ideation. The selected products covered a wide range of product categories such as bicycles, rain-pants, water bottles, or fountain pens. First, the participants mapped the key user concerns that their product (or service) could fulfill or harm. For this, they were asked to imagine themselves as the user of their chosen products. Second, they analyzed the relationships among these concerns and identified a potential concern conflict to resolve. Third, they formulated abstract and concrete representations of this conflict (i.e., *I want ...etc. vs. I want ...etc.*) using the three levels of personal dilemmas in Figure 4.3.

In the fourth and final step, they chose the most inspiring formulation to redesign their product in a way that resolves the concern conflict. To gain a better understanding of the design decisions, the participants were encouraged to communicate their design ideas in simple sketches and mind-maps, supported by an explanation of their approach.

Results

We used a frequency analysis method by counting how many times each abstraction level was employed by designers. We checked for the clarity and meaningfulness of each concern formulation. In addition, we categorized the design ideas according to the approach used to resolve the dilemma based on the similarities and differences among the written descriptions of these approaches. In the analysis process, we excluded two responses from our analysis due to incomplete formulations.

Figure 4.4 shows an example of how the participants followed the steps indicated in the design brief. The product used in this example was a Polaroid Camera. In the first step, the main concerns fulfilled or harmed by a Polaroid Camera were mapped out. In the second step, a pair of conflicting concerns was selected and formulated at three abstraction levels. Finally, the activity-focused concerns (i.e., "I want to take photos with a vintage experience" vs. "I want to make digital photos") were chosen as a starting point for a redesign that combines the efficiency of a digital camera and the vintage experience of a Polaroid camera.

Three levels (or nine combinations) of personal dilemmas

All participants were able to generate alternative dilemma formulations at all levels. Table 4.2 presents the frequency of participants' choice for the abstraction level they employed when formulating users' dilemmas and gives examples of conflicting concerns used for each combination. The results indicate that, overall, the activity level was used the most frequently (28 times) and the identity level was used the least frequently (11 times). The product level was used 19 times.

Furthermore, the within-level and cross-level combinations were analyzed. Within the abstraction levels, activity-activity combination was used the most frequently (18 times) followed by the identity-identity (seven times) and product-product (five times) combinations. Across the abstraction levels, the product-activity combination was

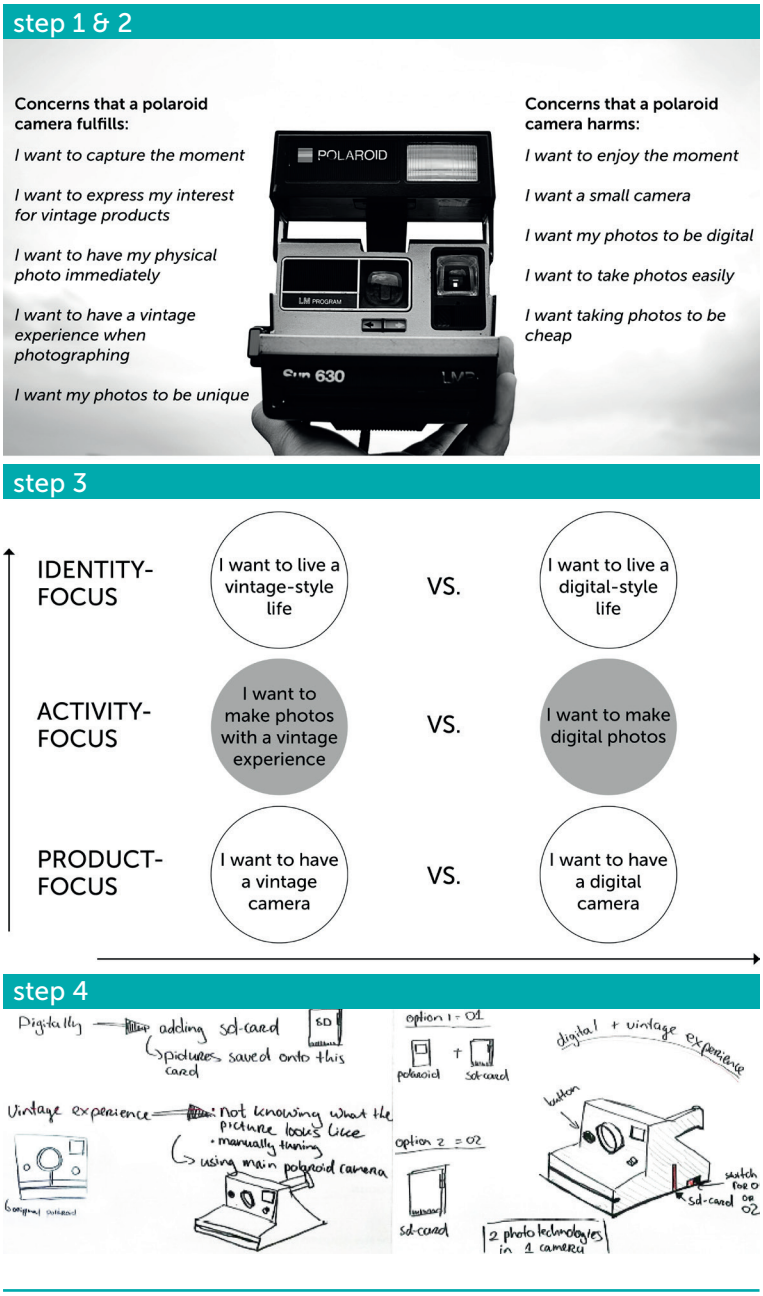


Figure 4.4. *An example response to the given design brief (designed by Gabriëlle Ribbens, 2014)*

used the most frequently (12 times) followed by activity-product (eight times), and identity-identity (seven times) combinations. The product-activity (or activity-product) was the most frequently used (20 times, together) cross-level combination. The product-identity (or identity-product) and activity-identity (or identity-activity) were the least frequently used cross-level combinations (two times each).

Analyzing the clarity of the concern formulations revealed that, for sixteen responses, the formulations could be interpreted as being at a different abstraction level than those indicated. For instance, "I want to show people all the books I have read" was indicated as an activity-focused concern, whereas it could also be interpreted as an identity-focused concern (e.g., conveying an intellectual personality). In addition, the difference between product-focused and activity-focused concerns was occasionally overlooked. For instance, the concern "I want to make digital photos" and "I want to make photos in a digital way" are, in fact, both product-focused concerns despite the latter having been indicated as an activity-focused concern. Finally, five participants used negative concern formulations, such as "I want to monitor my wellbeing but I do not want to feel pressured by the information I receive" although the proposed framework mainly emphasizes positive concern formulations.

Dilemma-resolving design strategies

Based on participants' written reflections, we identified four design strategies used to resolve conflicting concerns. These are: (1) blending, (2) fixing, (3) designing flexibility into the product, and (4) introducing new designs.

(1) Blending: This strategy combines characteristics of two products in a way that can simultaneously fulfill conflicting concerns. Two different products in the same product category (e.g., cameras) might have characteristics that fulfill different concerns, such as "I want to have a 'vintage' experience when making photos (i.e., use a polaroid camera)" vs. "I want to manage my photos easily (i.e., use a digital camera)" (see Figure 4.4). A Polaroid-style camera with a digital storage card might resolve this conflict, because it might enable a vintage experience as well as easy management of photos. For this redesign, the designer explained his approach as "I combined the properties from both cameras that I like in order to create an optimal design that fulfills both concerns." We identified seven redesigns that were based on this strategy.

(2) Fixing: Existing products sometimes meet a specific user concern while ignoring or violating another (e.g., rain-pants help staying dry in the rain, but they are often considered unfashionable). In such cases, the product can be redesigned in a way that maintains the fulfillment of the first concern (i.e., staying dry), while also fulfilling another

Table 4.2. Frequency of selection and example formulations for each concern combination

Level (Figure 4.3)	Concern combinations	Frequency of use	Dilemma examples
1.1	Product-Product	5	*"I want to have a small bag" vs. "I want to have a bag with many compartments"*
1.2	Product-Activity	12	*"I want to carry a small and light blanket when camping" vs. "I want to sleep next to my boyfriend when camping"*
1.3	Product-Identity	2	*"I want to use trendy products" vs. "I want to express my own personality through the products I use"*
2.1	Activity-Product	8	*"I want to show people all the books I have read (i.e., buy physical books)" vs. "I want to read books in a money-conscious way (i.e., read online)"*
2.2	Activity-Activity	18	*"I want to shave comfortably" vs. "I want to shave efficiently"*
2.3	Activity-Identity	2	*"I want to stay dry in the rain (i.e., wear rain-pants)" vs. "I want to look fashionable (i.e., wear my own clothes)"*
3.1	Identity-Product	2	*"I want to live a healthy life" vs. "I want to indulge in sweet snacks"*
3.2	Identity-Activity	2	*"I want to be a mobile professional" vs. "I want to work comfortably on my computer"*
3.3	Identity-Identity	7	*"I want to feel feminine" vs. "I want to look tough"*

concern relevant for the same situation (i.e., being fashionable). We called this strategy fixing. Fixing involved either modifying existing characteristics of a product (e.g., material, form) or adding new characteristics (e.g., new functionalities). For instance, rain-pants that is transparent enable staying dry, and at the same time, reveals the actual clothing of the wearer. In this way, it can maintain the fulfillment of the concern for staying dry, while also fulfilling the concern for being fashionable, (see Figure 4.5). Thirty redesigns were based on the fixing strategy.

(3) Designing flexibility into the product: When a product characteristic is preferred in some usage situations but not in others, an existing product can be redesigned to allow for flexible usage scenarios. For example, the conflict between "I want to have a small bag" vs. "I want to have a bag with many compartments", was resolved by creating removable backpack compartments that can be added to the backpack

Figure 4.5. Example of strategy, fixing: Transparent rain-pants that resolve the conflict between "I want to stay dry" vs. "I want to look fashionable" (designer unknown)

when needed (See Figure 4.6). This strategy resulted in modular products or products that allow for personal customization. Eight redesigns were based on this strategy.

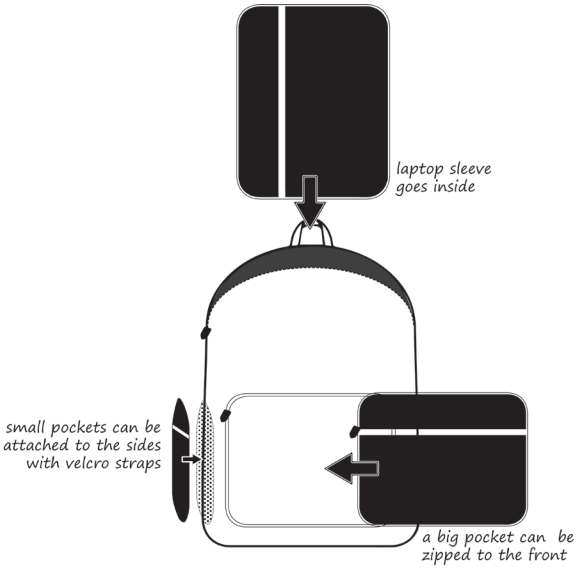


Figure 4.6. Example of strategy, designing flexibility into the product: Backpack with modular components that resolves the conflict between "I want to have a small bag" vs. "I want to have a bag with many compartments" (designed by Maurits ten Napel, 2014)

(4) Introducing new designs: This strategy involves designing a product that is in a different yet related category than the product selected for the design brief (instead of redesigning the same product). These new designs involved new packaging (e.g., e-books with a cover to enable physically displaying a book collection without having to buy the physical version of the book), a supporting service (e.g., a direct calling service for internet banking to enable one-to-one communication when needed), or a supporting product (e.g., a card reader that detects the remaining balance on a public transport card to enable efficient monitoring of expenses). For example, for the conflict between "I want to be a mobile professional" vs. "I want to work comfortably on my computer", the designer created a laptop bag that can be used to comfortably carry belongings essential for working, instead of redesigning the computer itself (see Figure 4.7). Eleven new designs were introduced in response to the given design brief.

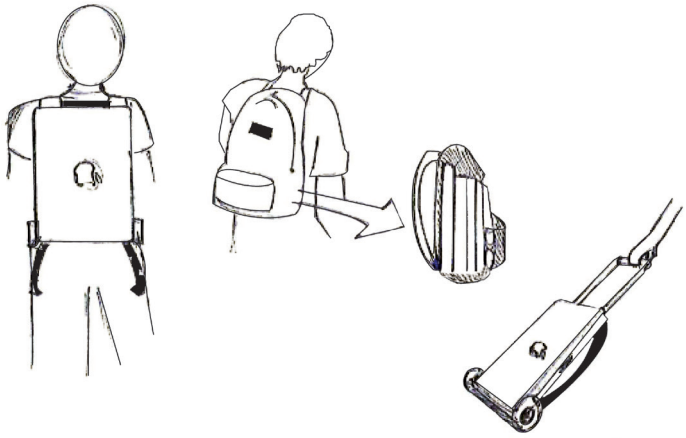


Figure 4.7. Example of strategy, introducing a new design: A laptop bag trolley that resolves the conflict between "I want to be a mobile professional" vs. "I want to work comfortably on my computer" (designed by Luis Herrera S., 2014)

Discussion

Using abstract vs. concrete formulations

The frequency of use for different abstraction levels showed that all levels could be used to formulate personal dilemmas, where activity-focused concerns were used most frequently. Activity-focused concerns balance the high number of design opportunities offered by abstract concerns with the tangible references offered by concrete concerns. When two abstract formulations (e.g., identity-identity combination) are paired, they might create a large solution space, as there are multiple instances that can fulfill each concern (see Ward, Patterson, & Sifonis, 2004). However, when paired, abstract formulations might not always clearly communicate a conflict. Consider the conflict between the product-focused concerns; "I want to have a small bag" vs. "I want to have a bag with many compartments." When abstracted, this concern conflict might become "I want to have a simple life" vs. "I want to lead an organized life." Although the conflict was clear when two product-focused concerns were paired, it becomes less clear when represented as an identity-identity combination, which might render the solution space less actionable.

Alternatively, when two concrete formulations (e.g., product-product combination) are paired, the resulting solution space is informative and actionable, yet restricted to a single product or a context (see Ward, Patterson, & Sifonis, 2004). For instance, resolving the conflict, "I want to have a small bag" vs. "I want to have a bag with many compartments", is likely to restrict the potential solutions to the redesign of a bag, whereas, not having a specific product as input might stimulate exploring alternative product categories. This is not to say that all product-product combinations are uninspiring. Product-focused concerns can inspire creative designs even if they restrict the solution space to a single product or context, examples of which are abundant in engineering design. In fact, TRIZ thrives on the creativity-enhancing nature of technical conflicts of this nature (see Moehrle, 2005).

Challenges of implementing the three levels of personal dilemmas

The variety of combinations that were adopted indicates that the rationale behind the three levels of personal dilemmas could easily be adopted. However, understanding the nuances among different

abstraction levels (i.e., product-, activity-, or identity-focused concerns) posed a steep learning curve. Primarily, we observed that making a concern more abstract (e.g., laddering up from product-focus to activity- or identity-focus) requires careful analysis and interpretation of users' concerns, which, to some degree, can be subjective.

In addition, finding appropriate instances of a concern (e.g., laddering down from identity-focus to activity- or product-focus) was a common challenge. Particularly, the subtle yet important difference between activity- and product-focused concerns was not always evident in participants' responses. For instance, "I want to make photos in a digital way", which was indicated as an activity-focused concern, could instead be phrased as "I want to manage my photos efficiently". The latter formulation better describes the quality of an activity (i.e., being efficient) rather than the quality of a product involved in the activity (i.e., digital photos).

Finally, we observed that several designers used negative formulations when formulating dilemmas, such as "I want to monitor my wellbeing but I do not want to feel pressured by the information I receive." Here, the negative formulation of the latter concern helps to communicate the tension among the concerns. However, it does not allow for identifying various instances that would fulfill that concern in ideation. Rephrasing this negative formulation as "I want to feel at ease about my physical wellbeing" makes it a better-suited formulation for ideation, because it allows for exploring solutions that can help 'feeling at ease'. Although it might not always be possible to rephrase a negative formulation in a positive way without changing the meaning of a concern, it is best to avoid negative formulations when possible.

Opportunities and challenges of using the design strategies

By analyzing the approach taken to resolve the formulated dilemmas, we identified four design strategies, namely blending, fixing, designing flexibility into the product, and introducing new designs. Each of the design strategies poses specific opportunities and challenges in ideation. *Blending* is a unique mental exercise for identifying concrete product characteristics that can satisfy abstract concerns (e.g., "I want to walk comfortably" vs. "I want to look elegant"). However, when meanings of abstract concepts (e.g., comfort, elegance) are not sufficiently explored, their combination might result in an overt

hybrid design (e.g., comfortable sneakers with high heels). Therefore, exploring the subtle embodiments of abstract concepts in concrete product features is important when using the blending strategy (see Özcan & Sonneveld, 2009). In line with this, designers should be encouraged to carefully think about the choice of keywords as meaning cues in concern formulations and to embody these cues in product conceptualization.

Fixing strategy can sometimes lead to a design that forces a compromise from the fulfillment of both concerns. For instance, to resolve the dilemma "I want to store my jewelry securely" vs. "I want to show off my jewelry", a conventional jewelry box was modified into a transparent one. However, this design neither fully fulfills the first concern (i.e., a transparent box might be less reliable than a safe) nor does it fully fulfill the second concern (i.e., a better way to showcase jewelry might be to wear it instead of keeping it in a box). Here, it is evident that the designer fixated on redesigning the chosen product (i.e., a jewelry box), instead of exploring other product categories or new practices (e.g., redesigning the jewelry itself or the social surroundings where jewelry might be worn). Therefore, critically thinking about the extent to which using the fixing strategy can satisfy conflicting concerns is a crucial step in ideation.

The designs that result from the strategy of *designing flexibility into the product* fulfill conflicting concerns alternately, instead of simultaneously. For instance, to resolve the dilemma between "I want to have a small bag" vs. "I want to have a bag with many compartments", a modular backpack design was proposed. This design forces the user to decide whether he would use his backpack with or without compartments at a particular point in time. Providing the option to fulfill concerns alternately, instead of simultaneously, might trigger new dilemmas (e.g., do I need the extra compartments today or not?), which might constitute a new source of user dissatisfaction. Therefore, when designing flexibility into the product, the consequences of using this strategy on the experience evoked by the resulting products should be carefully reflected up on.

When *introducing new designs,* participants explored related product categories, such as new packaging ideas or supporting services to form product-service combinations. Because of this, explicitly considering this strategy might be an eye-opener to consider novel design solutions

when redesigning a specific product. However, the resources and demands of a client might confine introducing new designs in real-life design practice.

Limitations

In this specific design brief, the participants did not engage in any user research prior to using the three levels of personal dilemmas. Instead, they had to rely on their own experiences as users of the selected products. If the participants were given the opportunity to conduct user research, the dilemma formulations could have been richer in detail and depth. In addition, the designers had little prior experience with the laddering techniques, which might have also influenced the clarity and consistency of the dilemma formulations.

General discussion

The findings of the teatime design case and the second study show that inspiring dilemma formulations can be discovered through consciously examining conflicting concerns within and across three abstraction levels. Abstract and concrete formulations have distinct characteristics (see Wiemer-Hastings & Xu, 2005). By the virtue of these differences, using them as input for ideation poses both opportunities and challenges (see Ward, Patterson, & Sifonis, 2004). In this paper, we explored alternative representations of conflicting concerns, where each concern could be formulated either at the same or at a different abstraction level as the pairing concern. Our findings are consistent with those in the literature: Concrete dilemmas create actionable design spaces, while abstract dilemmas stimulate novel thinking (Ward, Patterson, & Sifonis, 2004). Moreover, the dynamics of cross-level combinations enable balancing the advantages and disadvantages of using either type of formulation. As a result, combining concerns at different abstraction levels can result in a dilemma formulation that is abstract enough to offer opportunities for novel thinking, yet concrete enough to inform design decisions in ideation.

Examining conflicting concerns within and across different abstraction levels can be compared to other sense-making activities in the design process, such as problem framing and problem reframing. Problem framing in design is defined as the mental construction of a situation in the real world, which helps to make sense out of the situation (Jonassen, 2000). Analyzing dilemmas involves distilling the conflicting concerns involved in the dilemma, and as such, might

be considered as way of problem framing. Problem reframing, i.e., changing the problem representation, makes the core of the problem apparent (Simon, 1996). According to Banach and Ryan (2009, p. 107), problem reframing "shifts attention from trying to solve the current problem in the right way to asking whether the right problem is being solved." When resolving dilemmas, reformulating conflicting concerns at various abstraction levels creates new opportunities for stimulating design ideas, and thus, can be considered as an act of problem reframing.

The dilemma-resolving design strategies provide an overview of abstract solutions that can support using dilemma formulations in ideation. Similar to the way that concerns can be abstracted using laddering techniques to form alternative dilemma formulations, the specific solutions created to resolve dilemmas can be interpreted to form a set of abstract solutions, namely design strategies. Because of this, the dilemma-resolving strategies might be compared to the inventive principles of TRIZ. Moehrle (2005) defines these principles (e.g., giving feedback, changing the color, or thermal expansion) as abstract solutions to abstract problems that guide the ideation process when creating new inventions. The dilemma-resolving strategies work in a similar manner. Specifically, blending guides embodying abstract concerns in concrete product characteristics. Fixing and designing flexibility into the product provide possibilities for multi-functionality (or customization) and modularity, respectively. Introducing new designs prompts for exploring related product categories instead of limiting solutions to a single category. As a result, conceiving a variety of new design ideas becomes possible, given that the appropriateness of each design strategy with respect to dilemma formulations at various abstraction levels is consciously examined.

The design ideas created in the second study indicate that the participants often fixated on the product they chose, whereas the ideas created in the teatime study displayed more variety. This could be because the second study involved novice designers, whilst comfortably retrieving and storing information cued by abstract concepts is an ability that develops with design expertise (Cross, 2004). Another reason could be that the design brief for the teatime study did not specify a product, whereas the second study required extracting concern conflicts related to specified products. To better understand the relationship between the design output and the abstraction levels,

future research can focus on creating design ideas at all (or multiple) abstraction levels instead of choosing one level as input for ideation. This approach can enable comparing designs inspired by different dilemma formulations.

References

Altshuller, G. S. (1988). *Creativity as an Exact Science: The Theory of Inventive Problem Solving.* New York: Gordon and Breach.

Banach, S. J. & Ryan, A. (2009). The art of design: A design methodology. *Military Review, 89*(2), 105–111.

Benack, S., Basseches, M., & Swan, T. (1989). Dialectical thinking and adult creativity. In J. A. Glover, R. R. Ronning, and C. R. Reynolds (Eds.), *Handbook of Creativity* (pp. 199–208). New York: Springer US.

Cross, N. (2003). The expertise of exceptional designers. In N. Cross and E. Edmonds (Eds.), *Expertise in Design,* Creativity and Cognition Press, (pp. 23–35), Sydney: Sydney University of Technology.

Cross, N. (2004). Expertise in design: An overview. *Design Studies, 25*(5), 427–441.

De Jong, P. L. C., & Özcan, E. (2016). Tolerance of ambiguity in relationship to creativity and its implications for design practice. In P. M. A. Desmet, S. F. Fokkinga, G. D. S. Ludden, N. Cila, and H. Van Zuthem (Eds.), *Celebration & Contemplation: Proceedings of the 10th International Conference on Design and Emotion,* Amsterdam, The Netherlands, 27-30 September.

Desmet, P. M. A. (2008). Product emotion. In H. N. J. Schifferstein & P. Hekkert (Eds.), *Product Experience* (pp. 379–397). Amsterdam: Elsevier.

Jonassen, D. H. (2000). Toward a design theory of problem solving. *Educational Technology Research and Development, 48*(4), 63–85.

Kleiman, T., & Hassin, R. R. (2011). Non-conscious goal conflicts. *Journal of Experimental Social Psychology, 47*(3), 521–532.

Manyiwa, S., & Crawford, I. (2002). Determining linkages between consumer choices in a social context and the consumer's values: A means–end approach. *Journal of Consumer Behavior, 2*(1), 54–70.

Moehrle, M. G. (2005). What is TRIZ? From conceptual basics to a framework for research. *Creativity and Innovation Management, 14*(1), 3–13.

Ozkaramanli, D., & Desmet, P. M. A. (2012). I knew I shouldn't, yet I did it again! Emotion-driven design as a means to subjective well-being. *International Journal of Design, 6*(1), 27–39.

Ozkaramanli, D., Desmet, P. M. A., & Özcan, E. (2016) Beyond resolving dilemmas: Three design directions for addressing intrapersonal concern conflicts. *Design Issues, 32*(3), 78–91.

Ozkaramanli, D., Fokkinga, S. F., Desmet, P. M. A., Balkan, E., & George, E. (2013). Recreating AlaTurca; consumer goal conflicts as a creative driver for innovation. In D.S. Fellows (Ed.), Brilliant Transformations: *Proceedings of Qualitative Research 2013,* Valencia, 17-19 November. Amsterdam (NL): ESOMAR.

Özcan, E., & Sonneveld, M. (2009). Embodied explorations of sound and touch in conceptual design. In L. Chen, L. Feijs, M. Hessler, S. Kyffin, L. Pei-Ling, K. Overbeeke, and B. Young (Eds.), *Proceedings of Design and Semantics of Form and Movement DeSForM,* (pp. 173), Taipei, 26-27 October.

Reynolds, T. J., & Gutman, J. (1988). Laddering theory, method, analysis, and interpretation. *Journal of Advertising Research, 28*(1), 11–31.

Simon, H. A. (1996). *The Sciences of the Artificial.* MIT press.

Sheldon, K. M. (1995). Creativity and goal conflict. *Creativity Research Journal, 8*(3), 299–306.

Ward, T. B., Patterson, M. J., & Sifonis, C. M. (2004). The role of specificity and abstraction in creative idea generation. *Creativity Research Journal, 16*(1), 1–9.

Wiemer-Hastings, K., & Xu, X. (2005). Content differences for abstract and concrete concept. *Cognitive Science, 29*(5), 719–736.

CHAPTER 5

Long-term goals or immediate desires? How to use self-control dilemmas to design for distant gains

This chapter is entirely based on the following journal article: Ozkaramanli, D., Özcan, E., & Desmet, P.M.A. (2017). Long-term goals or immediate desires? How to use self-control dilemmas to design for distant gains. *The Design Journal, 20*(2), 219-238.[1]

Abstract

This paper suggests that designers can frame user behavior in terms of the conflicts between long-term goals and immediate desires (i.e., self-control dilemmas), and address these conflicts by facilitating the pursuit of long-term goals. A phenomenological study provided an understanding of self-control dilemmas and the strategies people use to deal with these dilemmas. Based on this understanding, this paper proposes a framework for analyzing self-control dilemmas and three supporting design strategies. The framework can act as an analysis tool when distinguishing between long-term goals and immediate desires, and the design strategies can facilitate generation of ideas that can address self-control dilemmas. Understanding these human principles offers novel opportunities for products, services, or policies that contribute to subjective wellbeing.

Keywords: self-control dilemma; user-centered design; design tools; user behavior; subjective wellbeing

1 This chapter is entirely based on the stated journal article without any modifications to its content. The style and formatting of the article have been modified to match the visual style of the thesis, and references to other thesis chapters have been added where appropriate.

Introduction

Imagine your alarm clock ringing in the morning. On the one hand, you want to get out of bed to head to work, but on the other hand, you are tempted to linger in the comfort of your warm bed. You are now experiencing a self-control dilemma: A conflict between a long-term goal (or personal value) and an immediate desire. We experience these conflicts all the time. Half the time people are awake, they experience a desire, and nearly half of these desires (47%) conflict with other personal goals (Hofmann et al., 2012). Snoozing in bed instead of getting up, indulging in unhealthy food when on a diet, and cleaning the desk instead of working towards a deadline are only a few examples of self-control dilemmas. These dilemmas always involve a trade-off between the size and the delay of an experienced benefit. On the one hand, the long-term goal promises larger benefits (e.g., being a responsible person) than the immediate desire. On the other hand, the benefits of the desire (e.g., lingering in bed) are experienced immediately; while the benefits of the long-term goal are delayed.

Regulating psychological processes, such as thoughts, emotions, moods, and actions, to balance the fulfillment of long-term goals and immediate desires is fundamental for subjective wellbeing (Sirgy & Wu, 2009). Referring to the work of Deci and Ryan (2008), we define subjective wellbeing (or happiness) as experiencing high levels of positive affect, low levels of negative affect, and a high degree of satisfaction with one's life. Based on this definition, fulfilling immediate desires can be a direct source of positive affect. Alternatively, pursuing long-term goals can be a source of general life satisfaction (see Brunstein, 1993). As a result, happiness requires a dynamic balance between the gratification of both immediate and delayed benefits (Huta & Ryan, 2010). Inspired by these distinct yet overlapping perspectives, Desmet and Pohlmeyer (2013) proposed a framework for positive design, which consists of three main components: pleasure (e.g., attaining immediate desires), personal significance (e.g., achieving long-term goals), and virtue. This framework emphasizes that designing for happiness takes all three components into account and is sensitive to conflicts between any of these components, including the conflicts between long-term goals and immediate desires (Desmet & Pohlmeyer, 2013).

In addition, supporting the fulfillment of long-term goals over interfering, immediate desires has become a topic of interest in

design for behavior change (see Tromp, 2013). Design approaches in this field often respond to behaviors that threaten long-term goals, such as smoking, recycling, or healthy eating. For example, Fogg (2003) suggests that personal motivation, ability to perform, and environmental triggers need to conjoin for successful behavior change. In addition, nudging interventions implicitly cue acting in socially desirable ways, an example of which is positioning fruit (instead of candy) at an eye-level shelf in a school cafeteria (Thaler & Sunstein, 2008). Social design investigates the theoretical and methodological underpinnings of designing such implicit influences (Tromp, 2013). Finally, Laschke et al (2014) outlines six principles that effective behavioral interventions should possess (e.g., naivety) in order to successfully replace habitual choices (e.g., driving to work instead of cycling). These approaches indicate that various design fields have indeed become sensitive to the behavioral manifestations of self-control dilemmas.

However, self-control dilemmas are more complex than they seem. Most importantly, it is often surprisingly difficult to distinguish long-term goals from immediate desires. The distinction is not absolute, and any goal can be a tempting desire with respect to another goal (Fishbach & Converse, 2011). Consider the previous example of doubtingly pressing the snooze button of your alarm clock in the morning. Here, the immediate desire is to linger in bed, whereas the long-term goal implies starting the day at a prearranged time. However, for an overachieving workaholic, the long-term goal might in fact be to get more sleep. This example illustrates that long-term goals and immediate desires are person and context dependent, and do not always align with behaviors that are intuitively labeled as 'desirable' or 'undesirable'. Therefore, exploring and analyzing the emergent nature of self-control dilemmas is a crucial first step before deciding which behavior to target for change.

This paper proposes a framework for analyzing self-control dilemmas. In addition, to illustrate how this framework can be put in practice, we suggest three supporting design strategies. First, we summarize the main self-control theories that inspired this research. Second, we report an empirical study that provides insights into self-control dilemmas through phenomenological interviewing. The framework and strategies are based on the literature on self-control theories and the findings of the phenomenological study. The overall findings of

this paper build on the emotion-focused understanding of self-control conflicts suggested by Ozkaramanli and Desmet (2012). Finally, we reflect upon the implications of our findings for design for subjective wellbeing and design for behavior change.

Understanding self-control dilemmas

The presence of choice alternatives in an environment that simultaneously cue long-term goals and immediate desires might induce a conflict among these goals (Fishbach & Zhang, 2008). For example, while shopping in a supermarket, browsing the fashion magazine section might cue the long-term goal of staying fit, whereas walking down the ice-cream section might cue the immediate desire for indulgence. Achieving long-term goals requires investment to ensure future benefits, even though these benefits are often challenging to predict. In contrast, fulfilling immediate desires is instantly pleasurable and easy to achieve. Because of these differences, immediate desires often interfere with pursuing long-term goals (e.g., wanting both to enjoy ice-cream and to stay fit) (Fishbach & Zhang, 2008). In a self-control dilemma, these 'interfering desires' are termed *temptations* (Fishbach & Converse, 2011).

Approaching self-control dilemmas from an emotional perspective, Giner-Sorolla (2001) made a distinction between hedonic emotions (e.g., satisfaction, excitement, dissatisfaction, frustration, boredom) and self-conscious emotions (e.g., pride, guilt, shame, embarrassment). Based on this distinction, the simultaneous experience of hedonic emotions and self-conscious emotions (e.g., satisfaction and guilt) can be an indicator of a self-control dilemma. Interestingly, hedonic emotions are more accessible in memory, and thus, they arise more quickly (i.e., less deliberately) than the more complex, self-conscious emotions. This explains why withstanding temptations is a challenge for effective self-control (Giner-Sorolla, 2001). This analysis is similar to the hot / cool analysis of self-control dilemmas, which suggests that immediate desires are governed by the hot (emotional) *go-system*, while long-term goals are governed by the cool (cognitive) *know-system* (Metcalfe & Mischel, 1999).

According to Counteractive Control Theory (CCT), people can in fact anticipate situations that might trigger a dilemma and use personal strategies to counteract temptations (Fishbach & Converse, 2011). Such personal strategies include self-imposed rewards or punishments,

inhibiting temptations, or activating long-term goals (Fishbach & Converse, 2011). For instance, hiding unhealthy snacks in a kitchen drawer when on a diet decreases their accessibility, which is an example of deliberately inhibiting temptations. Alternatively, stocking the house with fruits and vegetables supports having a healthy diet, which is an example of consciously activating long-term goals. Central to CCT is the asymmetrical motivational effect of personal strategies: the same strategy operates in alternate ways to either demotivate temptations (e.g., self-imposed punishment or inhibiting temptations) or to motivate long-term goals (e.g., self-imposed rewards or activating long-term goals).

Phenomenological study

Although there is extensive research on the psychology of self-control dilemmas, this research is often fragmented and abstract, making it challenging for designers to obtain a holistic and contextualized view on these dilemmas. To integrate this literature for the benefit of design activities, we adopted a phenomenological perspective to investigate self-control dilemmas. Phenomenology is both a philosophical school of thought and a qualitative research approach that focuses on the individual perception of experiences (Moustakas, 1994). Thus, it can offer a holistic (i.e., free from limitations of theoretical assumptions) and contextualized (i.e., embedded in everyday situations) understanding of self-control dilemmas (Moustakas, 1994).

People's descriptions of an experience often include details such as contextual information, personal motivations, and affective descriptions, across which the investigator can search for common patterns. In phenomenology, these common patterns are called essential themes or essences (Ehrich, 1996). By examining a series of experiential descriptions of self-control dilemmas, we aim to distil the essential themes that are specific to self-control dilemmas while preserving their contextualized nature. The research questions are:

1. What are the main ingredients of a self-control dilemma that can help designers to obtain a holistic understanding of this phenomenon?
2. What are the design-relevant self-control strategies people use to pursue long-term goals instead of fulfilling immediate desires?

Method

Ten interviews were conducted to investigate the subjective experience of self-control dilemmas across three life domains, namely unhealthy eating, procrastination, and unsafe sex. The study was limited to three domains to obtain a manageable variety of dilemmas when comparing common patterns. The mentioned domains were selected as they are among the most studied domains in self-control literature (see Baumeister & Heatherton, 1996).

Participants

Ten participants (five male, five female, age ranging between 21 and 59 years) voluntarily took part in the study and received a stationary gift for participation. Participants were of different ethnic origin (seven Dutch, one Portuguese, one German, and one Chinese).

Materials and procedure

The study lasted four weeks and consisted of a preparation and an interview stage (see Fokkinga & Desmet, 2012). In the preparation stage, participants received an experience booklet to be completed over two weeks. The goal of the booklet was to bring past dilemmas into awareness as input for the interviews. The booklets also served as sensitizing material (Visser et al., 2005).

The booklet started with a confidentiality statement to ensure anonymity. Next, participants reported their long-term goals related to three domains of study. On the following days, they completed nine exercises (three in each domain), with questions that asked for examples of self-control dilemmas. To avoid directive examples, questions were phrased around a hypothetical experience such as *'sometimes we eat or drink foods that we think we should not have. Can you think of a recent situation that you ate or drank something you should not have?'* The questions were not centered on human-product interaction to maintain a holistic view of the phenomenon (see appendix for an example exercise). In the second stage, participants were interviewed to detail the experiences in their booklets. Each interview lasted approximately one hour and was conducted in an informal and open way, and in an environment familiar to the participants (see Moustakas, 1994).

Data analysis

All interviews were voice-recorded and fully transcribed. Descriptions from the booklets were also added to the transcripts. Following Ehrich (1996), we used four procedural steps to analyze the results: (1) Reading the entire transcription to get a sense of the whole statement, (2) preparing 59 cards each representing a personal narrative about a self-control dilemma, (3) analyzing the cards to discriminate between the essential information and accidental information, which resulted in 48 cards, and (4) reviewing the remaining cards to identify the main ingredients (or essences) of self-control dilemmas.

Findings

The phenomenological study resulted in three ingredients for self-control dilemmas (i.e., mutually exclusive choices, conflicting goals, and mixed emotions) and three self-control strategies people use to deal with their dilemmas (i.e., seeking new information, creating barriers and enablers, and self-imposed punishments and rewards).

Ingredients of self-control dilemmas

The common patterns captured across participants' experiences enabled us to formulate a structure for self-control dilemmas that represents its three essential ingredients, namely mutually exclusive choices, conflicting goals, and mixed emotions. To summarize, when people have to choose between two alternatives that are mutually exclusive (choices), and they are aware that each choice is associated with potential losses and gains which touch upon their personal goals (goals), each choice will inevitably elicit both positive and negative emotions (emotions).

Table 5.1 gives an overview of all choices, underlying goals, and mixed emotions identified in the analysis of participants' self-control dilemmas. The first column indicates the number of personal narratives associated with each self-control dilemma. Each choice alternative corresponds either to an immediate desire or a long-term goal and a pair of mixed emotions.

Table 5.1. Overview of choices, goals, and emotions involved in participants' self-control dilemmas

No. of cards	Immediate desire			Long-term goal		
	Choice	Goal	Emotion	Choice	Goal	Emotion
8	Relaxing (e.g., doing something easy)	I want to be relaxed and carefree	Relief /relaxation and guilt /shame /regret	Finishing a task for work/school	I want to be successful at work/school	Pride /confidence and distress
10	Socializing (e.g., going out with friends)	I want to have fun	Excitement and guilt /shame /regret	Finishing a task for work/school	I want to be successful at work/school	Pride /confidence and boredom
14	Indulging in unhealthy food/snacks	I want to enjoy my food	Satisfaction and guilt /shame /regret	Controlling portions	I want to have a healthy and balanced diet	Pride /confidence and dissatisfaction
10	Relaxing (e.g., watching TV)	I want to be relaxed and carefree	Relief /relaxation and guilt /shame /regret	Doing health promoting activities	I want to be slim and physically fit	Pride /confidence and distress
4	Skipping using a condom	I want to enjoy the moment	Satisfaction and guilt /shame /regret	Using a condom	I want to be safe	Pride /confidence and dissatisfaction
2	Postponing talking about using a condom	I want to show intimacy and trust	Intimacy, and guilt /shame /regret	Talking about using a condom	I want to be safe	Pride /confidence and isolation

While Table 5.1 gives an overview of the main results, it says little about the lived experience of self-control dilemmas. Table 5.2 provides three elaborate personal narratives that include contextual details, affective descriptions, and personal anecdotes. These personal narratives correspond to the first, third, and fifth rows in Table 5.1, and they will occasionally be used as reference points in the rest of this article.

Table 5.2. Personal narratives

1 – Just get it over with
I am a lawyer. That day, I had to make the final decision for a case. I could choose to start with a new case or to make this decision and finish the case I was working on. At that moment, I told myself 'this poor woman will lose the case, I really do not want to make this decision now.' But it was useless to wait, because I had already finished most of the work. I told myself 'Come on! Just get it over with!' If you postpone important tasks to the last moment, you continue to stress about it. But I want to do my work well.
2 – My eyes are bigger than my tummy
I was in London for holiday, which is a very exciting place. We had just had a nice dinner, and we were on our way to a play when walking by this patisserie. The window was filled with beautiful cakes. I felt tempted to have one. I knew it was over the top, because we were already full. But I was so tempted that I could not resist it. I told myself 'you are in London only once, you should do it! And it was delicious. But, when I was sitting there eating the pie, I suddenly felt really full and regretted it. I thought to myself 'this is really stupid, you were already full!' I recognize this in myself: my eyes are always bigger than my tummy.
3 – Getting the condom is always a bit weird
Getting the condom is always a bit weird; the person is just waiting there. If you are comfortable with somebody, it is fine to have these moments. But it should be smoother with someone you do not know. Imagine that you just met with someone in a bar, and there is a connection. You go home together, you walk up to the same house, and you enter the same room... You have been building up to this moment. If you stop to say something, you may offend the other person. Instead, I created the illusion in my mind that I would be safe.

Self-control strategies

We defined self-control strategies as systematic patterns of thoughts or actions that participants used to deal with the conflicts between immediate desires and long-term goals, and categorized them according to the themes that emerged from the data. This resulted in three strategies: seeking new information, creating barriers and enablers, and self-imposed punishments and rewards. Seeking new information increases the level of awareness about the consequences of fulfilling immediate desires or pursuing long-term goals. 'Creating barriers' increases the physical or cognitive effort needed to fulfill immediate desires, while 'creating enablers' decreases the effort needed to pursue long-term goals. Finally, 'self-imposed punishments' make fulfilling immediate desires less enjoyable, and 'self-imposed rewards' make pursuing long-term goals more enjoyable. Table 5.3 explains each of these strategies. Note that the second strategy (barriers and enablers) is divided into three sub-strategies.

Table 5.3. *Participants' self-control strategies*

Definition of the self-control strategy	Variants of the self-control strategy	Example (taken from the interviews)
Seeking new information	Increasing one's awareness about the losses of fulfilling temptations	*I read this book that explains the nutritional value of everything. If I know these simple things, I can really improve my health.*
	Increasing one's awareness about the gains of pursuing long-term goals	*I imagined myself wearing my favorite bikini on the beach and that helped me on several occasions to not ruin my diet.*
Creating barriers or enablers	Modifying the environment to remove cues for temptations.	*I put away all the distractions, like my guitar and my mobile, when I need to prepare for an exam.*
	Modifying the environment to create cues for long-term goals.	*I keep textbooks on my night table to remind myself of doing some extra reading for work before going to bed.*
	Increasing the physical distance to temptations.	*If I buy chips as a snack, I usually hide them in the cupboard to forget about them.*
	Decreasing the physical distance to long-term goals.	*I buy a lot of fruit to encourage myself to eat more fruit every day, because it helps me to be more energetic.*
	Making concrete plans to forgo temptations.	*After a week full of social occasions involving wine and beer, I told myself: no alcohol next week!*
	Making concrete plans to pursue long-term goals.	*This morning I told myself: I am going to eat 6 pieces of bread today, because I want to gain more weight.*
Self-imposed punishments or rewards	Making temptations less enjoyable through associating them with the violation of another goal.	*It is easier to do my homework with a friend. It makes me feel the pressure to study, because if I don't, I look like someone with no self-control.*
	Making long-term goals more enjoyable through associating them with the fulfillment of another goal.	*When I had a deadline for an important paper, I gave myself two hours to write and two hours to watch a movie.*

Discussion

The content of participants' personal narratives can be traced back to the battle between the hot/cool (go-/know-system) analysis of self-control dilemmas (Metcalfe & Mischel, 1999). In the third personal narrative, the go-system advises the person to focus on the present and skip using a condom: *stopping to get the condom could ruin the moment – why bother?* On the other hand, the know-system advises the person to focus on the future and use a condom: *skipping the condom could*

mean contracting a disease – why be a fool? The remarkable differences in the characteristics of these two systems are helpful in understanding why people have the tendency to give into immediate desires – and more importantly – why it might be a good idea to support the pursuit of long-term goals in such situations.

What constitutes a long-term goal or a temptation requires deliberation. For example, one might skip using a condom to enjoy the moment (temptation) *or* to express trust and intimacy towards his partner. Here, enjoyment seems like a typical temptation, whereas expressing trust indicates a more reflective stance. However, in either case, not using a condom threatens the goal of safety (long-term goal). Could, therefore, expressing trust also be a temptation in this specific situation? We argue that any goal, which promises immediate comfort as an escape from investing in a goal with valued future benefits, can be considered a temptation. Therefore, expressing trust might, in this specific situation, be a temptation with respect to the goal of safety. Because of such implicit nuances, designing with self-control dilemmas requires conscious exploration and careful analysis of the motivations underlying specific behaviors.

The emotions experienced in self-control dilemmas can give clues on the differences between long-term goals and immediate desires. In line with the work of Giner-Sorolla (2001), many participants reported guilt or shame for compromising a long-term goal, even though they simultaneously experienced satisfaction for fulfilling an immediate desire. When participants were able to maintain the pursuit of a long-term goal, they reported emotions such as pride and confidence, as well as emotions such as dissatisfaction and frustration for forgoing a desire.

Finally, we identified three different self-control strategies that people create to maintain the pursuit of long-term goals. By supporting long-term goals, these self-control strategies can decrease the motivational strength of immediate desires, which is in line with the proposition of Counteractive Control Theory (CCT) (Fishbach & Converse, 2011). For example, self-imposed punishments and rewards are among the strategies proposed by CCT (see Fishbach & Converse, 2011). Additionally, creating barriers or enablers work in a similar manner as strategies such as pre-commitment to pursuing long-term goals (or forgoing temptations) (see Fishbach & Converse, 2011).

Opportunities for design tools

This section builds on the findings of the phenomenological study to propose a toolset for designers: framework for analyzing self-control dilemmas and an overview of design strategies to address these dilemmas.

Framework for analyzing self-control dilemmas

The phenomenological study revealed that dilemmas are compounded phenomena with motivational, emotional, and behavioral ingredients. The framework of dilemmas provides a structured way of thinking when exploring the richness of these ingredients, and thus, it can support making informed decisions about the nuances between long-term goals and immediate desires. Figure 5.1 shows the graphical representation of the framework based on the first personal narrative, 'just get it over with', in Table 5.2. Although the content of the ingredients might change based on the specific dilemma being analyzed, the proposed structure of the framework remains intact.

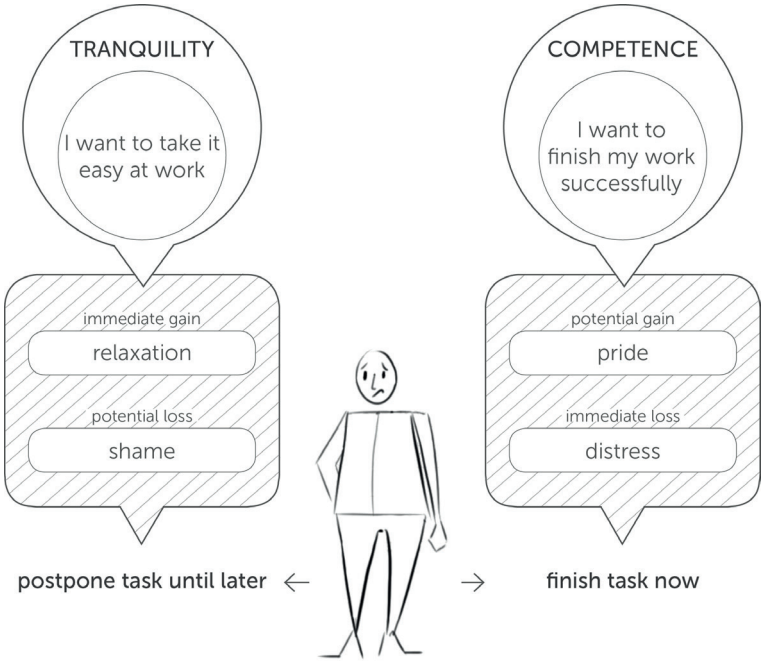


Figure 5.1. Framework of self-control dilemmas showing three main ingredients of dilemmas

Three features make the content of this framework specific to self-control dilemmas:

1. The framework illustrates an immediate gain versus a potential loss (or potential gain versus immediate loss) associated with the choices

made. This distinction implies inter-temporal choice and encourages exploring the consequences of both choices.

2. One of the conflicting goals is an interfering immediate desire (i.e., a temptation) with respect to the other goal (Fishbach & Converse, 2011).
3. The simultaneous experience of self-conscious emotions (e.g., pride, guilt) and hedonic emotions (e.g., satisfaction, boredom) is an indicator of self-control dilemmas (Giner-Sorolla, 2001).

The rest of this section uses the same narrative ('just get it over with') as an example to explain the three main ingredients of self-control dilemmas.

Mutually exclusive choices

Each choice in a self-control dilemma comes with a gain and a loss. On the one hand, postponing the task guarantees temporary relief (immediate gain), but it risks being on time (potential loss). On the other hand, finishing the task promises being on time (potential gain), but it costs time and effort in the present moment (immediate loss). Note that there might be many choices associated with temptations or long-term goals in a given context; however, for simplicity, the framework is limited to two choices representing a *di*-lemma.

Conflicting goals

The gain and loss of each choice in a self-control dilemma are determined by the underlying motivation. In the previous example, the participant wanted to postpone her work because she wanted a temporary relief from the pressure of having to make a difficult decision (immediate desire for tranquility). However, she also wanted to do her work well (goal of competence).

Determining the true motivation behind a choice is critical for designers in gaining a nuanced understanding of a dilemma. For instance, the person might have wanted to complete the task on time to achieve good results (goal of competence), or to leave work on time to join a family dinner (goal of belonging). To accurately formulate goal statements based on users' self-reports, designers can use the goal taxonomy of Ford (1992), which provides a complete yet compact overview of twenty-four universal human goals.

Mixed emotions

Due to the gains and losses associated with each choice, settling on any one of the choices will evoke mixed emotions regardless of the choice. In the previous example, the participant anticipated *pride* for finishing the task on time, while wanting to avoid the *distress* of having to finish it. She also reported wanting to start a new task, which could evoke *relaxation* for avoiding the stressful task, as well as *shame* for demonstrating incompetent behavior. Note that the framework is limited to *anticipated* mixed emotions, which are evoked by the *anticipated* gains and losses of each choice.

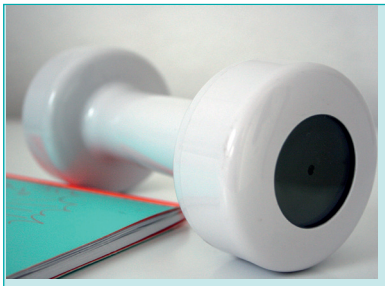
Design strategies to address self-control dilemmas

Inspired by the self-control strategies in Table 5.3, the design strategies aim to encourage activities that motivate long-term goals when they conflict with immediate desires. The end-goal here is to either *demotivate immediate desires* by (1) adding new sources of displeasure to temptations, (2) making potential losses of temptations tangible, and (3) creating barriers to temptations; or to *motivate long-term goals* by (1) adding new sources of pleasure to long-term goals, (2) making potential gains of long-term goals tangible, and (3) creating enablers for long-term goals. 'Creating barriers', 'adding displeasures', and 'making losses tangible' are design strategies that actively lessen the motivational strength of temptations. In contrast, 'creating enablers', 'adding pleasures', and 'making gains tangible' are design strategies that actively increase the motivational strength of long-term goals.

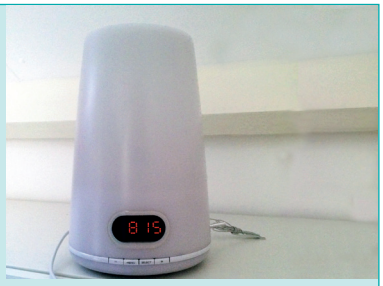
Consider the dilemma between lingering in bed and getting up on time in the morning. Here, the designer can either demotivate the goal of tranquility (lingering in bed) or motivate the goal of responsibility (getting up on time). Figure 5.2 shows six designs of existing clocks that align with the proposed design strategies.

Adding new sources of displeasure or pleasure

This design strategy is inspired by self-imposed punishments and rewards (see Table 5.3). Designers can introduce new sources of displeasure to make temptations less enjoyable. For example, evoking negative hedonic emotions, such as annoyance, (e.g., Dumb-bell alarm clock in Figure 5.2) or enhancing negative self-conscious emotions (e.g., imagine an alarm clock that humiliates you for snoozing in bed by posting this behavior on your Facebook profile) can demotivate temptations. Similarly, introducing positive hedonic emotions to long-



Adding new sources of displeasure to snoozing in bed:
Dumb-bell alarm clock requires you to swing it 20 times to turn off the alarm.
(Photo by the first author)



Adding new sources of pleasure to getting up on time:
Philips Wake-up Light uses light and sound to wake you up in a gentle and natural way.
(Photo by the first author)

Making losses of snoozing in bed tangible:
Life Counter by Ippei Matsumoto lets you choose how many years you would like to live and start the counter. It counts down the number of years, days, hours, or seconds you have left to live, shown on different faces.
(Photo: Courtesy of the designer)

Making gains of getting up on time tangible:
HabitClock by LifeSetter is an alarm clock that visualizes your morning routine in simple steps to help you adopt a healthy morning ritual.
(Photo by the first author)

Creating barriers for snoozing in bed:
Clocky by Gauri Nanda runs off after your first snooze time expires, forcing you to get out of bed to silence it.
(Photo by the first author)

Creating enablers for getting up on time:
Scribble alarm clock lets you write reminders on a dry-erase board that illuminates for ten seconds when its alarm sounds in the morning.
(Photo by the first author)

Figure 5.2. Product examples that align with the proposed design strategies and that can address the dilemma between lingering in bed and getting up on time

term goals (e.g., Philips Wake-up Light in Figure 5.2) or enhancing positive self-conscious emotions (e.g., imagine an alarm clock that appreciates you for being on time) can motivate long-term goals.

To give another example, consider the dilemma between the goal of tranquility (i.e., doing something easy) and the goal of mastery

(i.e., finishing up a challenging task). StickK.com in Figure 5.3 is an online platform that invites users to publicly set a goal. It also provides the option to designate a set amount of money that the user will lose if he procrastinates (adding new sources of displeasure to the temptation). This feature might demotivate temptations by violating another personal goal (i.e., saving money). Alternatively, StickK.com allows the user to invite friends to the platform, who could support the user in being productive (adding new sources of pleasure to the long-term goal). This feature might motivate the long-term goal by fulfilling another personal goal (i.e., belonging).

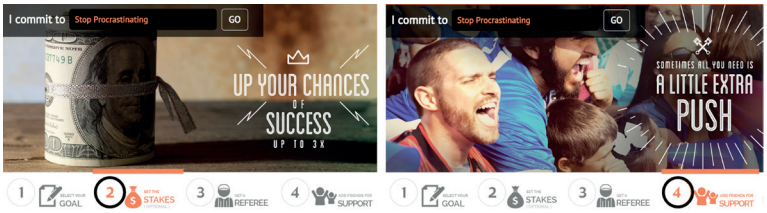


Figure 5.3. StickK.com: an online platform to prevent procrastination (reprinted with permission)

Making potential losses or gains tangible

This design strategy is inspired by seeking new information about the consequences of one's choices (see Table 5.3). For example, Life Counter (see Figure 5.2) vividly emphasizes the loss of time, which might demotivate time spent sleeping. Similarly, HabitClock (see Figure 5.2) visualizes the steps of a healthy morning ritual predetermined by the user, which might motivate repeating this ritual every morning.

Using a similar strategy, the Condom USB flash drive (Figure 5.4) uses a metaphor that might remind the user about the consequences of having unsafe sex (making losses of temptations tangible). If one does not pay attention to being safe, the body, similar to a computer, can get infected with viruses. Alternatively, 'where did you wear it?' (Figure 5.4) is an online platform that lets users log into a website (www.wheredidyouwearit.com) using the QR-code on a condom packaging, where they can explore the benefits of having safe sex (making gains of long-term goals tangible).

Creating barriers or enablers

Similar to the self-control strategies on barriers and enablers in Table 5.3, designers can modify the physical or mental effort associated with temptations or long-term goals. Scribble alarm clock in Figure

Figure 5.4. Condom USB by Evgeny Filatov and a screenshot from the website of 'where did you wear it?' by Planned Parenthood (reprinted with permission)

5.2 decreases the mental effort needed to recall activities to be a responsible person, and thus, it acts as an enabler for this long-term goal. Similarly, Clocky in Figure 5.2 increases the physical effort needed to linger in bed, and thus, it acts as a barrier to the temptation.

In addition, KitchenSafe (Figure 5.5) is an appliance with a time-controlled lock mechanism, which, for a desired amount of time, prevents access to tempting food (e.g., candy). In this way, it creates a barrier to indulging in sweet snacks. Similarly, ChiquiSafe (Figure 5.5) is a banana holder that can act as a cue for eating fruit as a healthy snack. In this way, it creates an enabler for maintaining a healthy diet.

Figure 5.5. KitchenSafe by David Krippendorf and ChiquiSafe by David Dos Santos (reprinted with permission)

General discussion

The purpose of this paper was to explore how design can support people in withstanding temptations when pursuing long-term goals. The phenomenological study generated insights in the manifestations of self-control dilemmas, which were supported by the theory in self-control literature. The proposed design tools (i.e., the framework and the design strategies), which were based on existing self-control theories and the findings of the phenomenological study, aim to encourage critical thinking (versus immediate judging) when designing with self-control dilemmas.

The framework of self-control dilemmas can provide design teams with deeper understanding into users' mindset and context, which enables making an informed decision about what a long-term goal and an interfering desire might be. For instance, failing to use a condom (see example in Table 5.2) can be interpreted as a temptation, but it can also be interpreted as an instance of expressing trust to a potential partner. Being wary of offending a potential partner might in fact convey a reflective stance towards the situation, and thus, skipping using a condom might also be interpreted as a future-oriented goal. By providing a platform for exploring such nuances when analyzing self-report measures, the framework can support making informed decisions about what constitutes a long-term goal or a temptation in a specific situation.

We argue that, with the aforementioned characteristics, the framework can be a complementary tool to behavioral change approaches, such as persuasive technologies (e.g., Fogg, 2003), nudging (Thaler & Sunstein, 2008), social design (Tromp, 2013), pleasurable troublemakers (Laschke et al., 2014), and the stages of change perspective (Ludden & Ruijter, 2016). These approaches often select an individually or socially undesirable behavior to change, such as smoking, unhealthy eating, littering, or physical inactivity, respectively. Although the direction of change may seem obvious in these examples (e.g., quitting smoking), the framework can support design teams in consciously examining what might motivate users to adopt this change (i.e., their long-term goals) as well as what the barriers to change might be (i.e., their temptations). For instance, in the case of smoking, a motivation to quit smoking might be to avoid shortness of breath when exercising *or* to have whiter teeth. Alternatively, a barrier to quit smoking might be the joy of socializing with other smokers. In short, filling in the framework might act as a reflective lens when identifying the true motivations that might fuel behavior change, as well as the motivations that underlie the resistance to change.

The proposed design strategies aim to facilitate the creation of products and services that guide prioritizing long-term goals over immediate desires. Here, it is important to emphasize that designing for the fulfillment of both long-term goals *and* immediate desires is important for subjective wellbeing (Sirgy & Wu, 2009; Desmet & Pohlmeyer, 2013). The main contribution of distinguishing between long-term goals and immediate desires is to encourage sensitivity

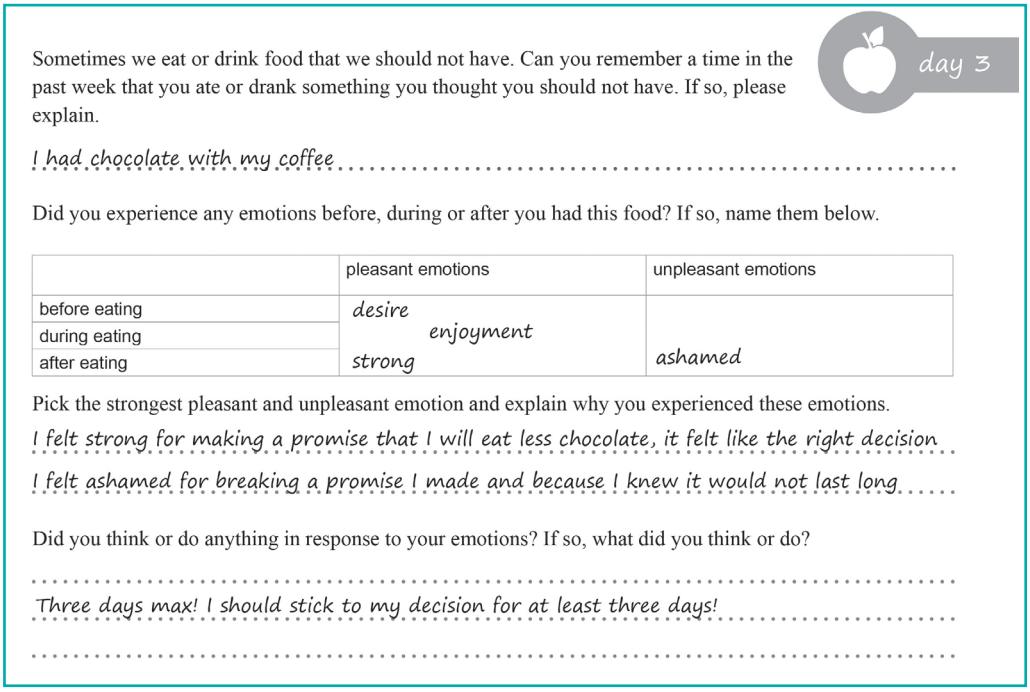
towards situations in which immediate desires interfere with long-term goals. Such situations, unless managed constructively, can threaten subjective wellbeing (Riediger & Freund, 2004). The design strategies proposed in this paper intend to balance the motivational strength of temptations with that of long-term goals, which might result in products that align with the self-control strategies people create to counteract temptations.

The suggested design strategies are analogous to user-agentive strategies discussed in the literature on design for sustainable behavior (e.g., giving feedback, enabling, encouraging, seducing) (see Wilson et al., 2015). Specifically, 'making potential losses and gains tangible' can be compared to feedback strategies for behavior change, 'barriers and enablers' to constraints and affordances, and 'adding new sources of displeasure or pleasure' to penalties and incentives (see Bhamra et al., 2011). Although similar strategies already exist in design literature, the contribution of this paper is to provide an overview of these strategies that is complementary to framing user behavior through the lens of self-control dilemmas. This perspective expands the solution space to motivating long-term goals (e.g., energy-conscious living), as well as demotivating temptations (e.g., comfort-oriented living).

Evaluating the proposed tools (i.e., framework and strategies) to evaluate their contribution to analysis and synthesis in the design process is a critical topic for future research. Another important research direction is to compare the experiences with products that result from these strategies (e.g., an alarm clock that puts a barrier to snoozing in bed) to experiences with other products in the same category (e.g., a regular alarm clock). As products resulting from these strategies intend to motivate long-term goals, we anticipate that they will enable people to adopt a more reflective stance towards their everyday choices. Finally, the proposed framework, due to its focus on individual experiences, poses a number of limitations that might be considered in future research. First, the framework does not account for some of the important factors that influence human decision-making, such as the role of personal and cultural values or personality traits. Second, the framework conceptualizes self-control dilemmas as snapshots of experiences, which, in that snapshot, assert that immediate desires are less preferable when pursuing happiness. Therefore, future studies can focus on understanding how people balance the fulfillment of immediate desires and long-term goals

over time in order to extend the framework in a way that it can accommodate a dynamic set of values and tools to aid designers in a more objective manner.

Appendix



day 3

Sometimes we eat or drink food that we should not have. Can you remember a time in the past week that you ate or drank something you thought you should not have. If so, please explain.

I had chocolate with my coffee

Did you experience any emotions before, during or after you had this food? If so, name them below.

	pleasant emotions	unpleasant emotions
before eating	desire	
during eating	enjoyment	
after eating	strong	ashamed

Pick the strongest pleasant and unpleasant emotion and explain why you experienced these emotions.

I felt strong for making a promise that I will eat less chocolate, it felt like the right decision

I felt ashamed for breaking a promise I made and because I knew it would not last long

Did you think or do anything in response to your emotions? If so, what did you think or do?

Three days max! I should stick to my decision for at least three days!

Figure 5.6. *Example exercise from the booklet used in the phenomenological study*

References

Baumeister, R. F., & Heatherton, T. F. (1996). Self-regulation failure: An overview. *Psychological Inquiry, 7*(1), 1–15.

Bhamra, T., Lilley, D., & Tang, T. (2011). Design for sustainable behavior: using products to change consumer behavior. *The Design Journal, 14*(4), 427–445.

Brunstein, J. C. (1993). Personal goals and subjective well-being: A longitudinal study. *Journal of Personality and Social Psychology, 65*(5), 1061–1070.

Deci, E. L., & Ryan, R. M. (2008). Hedonia, eudaimonia, and well-being: An introduction. *Journal of Happiness Studies, 9*(1), 1–11.

Desmet, P. M. A., & Pohlmeyer, A. E. (2013). Positive design: An introduction to design for subjective well-being. *International Journal of Design, 7*(3), 5¬–19.

Ehrich, L. (1996). The difficulties of using phenomenology: A novice researcher's experience. In P. Willis and B. Neville (Eds.), *Qualitative Research Practice in Adult Education* (pp. 199–216). Ringwood, Victoria: David Lovell Publishing.

Fishbach, A., & Converse, B. A. (2011). Identifying and battling temptation. In K. D. Vohs and R. F. Baumeister (Eds.), *Handbook of Self-regulation: Research, Theory, and Applications* (pp. 244–260). New York: The Guilford Press.

Fishbach, A., & Zhang, Y. (2008). Together or apart: When goals and temptations complement versus compete. *Journal of Personality and Social Psychology, 94*(4), 547–559.

Fogg, B. J. (2003). *Persuasive Technology: Using Computers to Change What We Think and Do.* Boston, MA: Morgan Kaufmann.

Fokkinga, S., & Desmet, P. M. A. (2012). Meaningful mix or tricky conflict: A categorization of mixed emotions and their usefulness for design. In J. Brassett, P. Hekkert, G. Ludden, M. Malpass and J. McDonnell (Eds.), *Proceedings of the 8th International Conference on Design and Emotion,* London, 11-14 September.

Ford, M. E. (1992). *Motivating Humans: Goals, Emotions, and Personal Agency Beliefs.* California: Sage Publications.

Giner-Sorolla, R. (2001). Guilty pleasures and grim necessities: Affective attitudes in dilemmas of self-control. *Journal of Personality and Social Psychology, 80*(2), 206–221.

Hofmann, W., Baumeister, R. F., Förster, G., & Vohs, K. D. (2012). Everyday temptations: An experience sampling study of desire, conflict, and self-control. *Journal of Personality and Social Psychology, 102*(6), 1318–1337.

Huta, V., & Ryan, R. M. (2010). Pursuing pleasure or virtue: The differential and overlapping well-being benefits of hedonic and eudaimonic motives. *Journal of Happiness Studies 11*(6), 735–762.

Laschke, M., Diefenbach, S., Schneider, T., & Hassenzahl, M. (2014). Keymoment: Initiating behavior change through friendly friction. In *Proceedings of the 8th Nordic Conference on Human-Computer Interaction: Fun, Fast, Foundational,* October 26–30, Helsinki, (pp. 853–858). New York: ACM Press.

Ludden, G., & de Ruijter, L. (2016). Supporting healthy behavior; A stages of change perspective on changing snacking habits of children. In *Proceedings of DRS 2016, Design Research Society 50th Anniversary Conference.* 27–30 June, Brighton, UK.

Metcalfe, J., & Mischel, W. (1999). A hot/cool-system analysis of delay of gratification: Dynamics of willpower. *Psychological Review, 106*(1), 3–19.

Moustakas, C. (1994). *Phenomenological Research Methods.* Thousand Oaks, CA, USA: Sage Publications.

Ozkaramanli, D., & Desmet, P. M. A. (2012). I knew I shouldn't, yet I did it again! Emotion-driven design as a means to motivate subjective well-being. *International Journal of Design, 6*(1), 27–39.

Riediger, M., & Freund, A. M. (2004). Interference and facilitation among personal goals: Differential associations with subjective well-being and persistent goal pursuit. *Personality and Social Psychology Bulletin, 30*(12), 1511–1523.

Sirgy, M. J., & Wu, J. (2009). The pleasant life, the engaged life, and the meaningful life: What about the balanced life? *Journal of Happiness Studies, 10*(2), 183–196.

Thaler, R. H., & Sunstein, C. R. (2008). *Nudge: Improving Decisions about Health, Wealth, and Happiness.* New York: Penguin Books.

Tromp, N. (2013). *Social Design.* Unpublished doctoral dissertation. Delft University of Technology, Delft, The Netherlands.

Wilson, G. T., Bhamra, T., & Lilley, D. (2015). The considerations and limitations of feedback as a strategy for behavior change. *International Journal of Sustainable Engineering, 8*(3), 186–195.

Sleeswijk-Visser, F., Stappers, P. J., van der Lugt, R., & Sanders, E. B. N. (2005). Contextmapping: Experiences from practice. *CoDesign, 1*(2), 119–149.

CHAPTER 6

Provocative design for unprovocative designers: Strategies for triggering personal dilemmas

This chapter is entirely based on the following conference paper: Ozkaramanli, D., & Desmet, P.M.A. (2016). Provocative design for unprovocative designers: Strategies for triggering personal dilemmas. *Proceedings of DRS 2016, Design Research Society 50th Anniversary Conference.* Brighton, 27–30 June.[1]

Abstract

Traditional design approaches stimulate the creation of products that make daily interactions more efficient, comfortable, and pleasant. In contrast, provocative design approaches, such as critical design, have a different focus: they aim to challenge the status quo through products that expose assumptions and stimulate discussion. In this paper, we argue that intentionally triggering personal dilemmas is a novel design approach that may be a means to enabling self-reflection. In line with this, this paper proposes three design strategies for triggering dilemmas. These strategies are explained through existing designs and supported by design ideas created using them. Our findings indicate that triggering dilemmas is a counter-intuitive design intention, which can be supported by exercises that facilitate perspective taking and stalling moral judgment. We conclude with a discussion on the overlap between triggering dilemmas and other provocative design fields.

Keywords: design with dilemmas; provocative design; design strategy; conflicting concerns

1 This chapter is entirely based on the stated conference paper without any modifications to its content. The style and formatting of the article have been modified to match the visual style of the thesis, and references to other thesis chapters have been added where appropriate.

Introduction

Traditional industrial design often focuses on solving problems (Roozenburg & Eekels, 1995). Smartphones enable managing online tasks without having to carry around a personal computer, or office chairs support sitting comfortably during long work hours. A distinct group of design approaches, namely provocative design approaches, share a goal that is often at odds with traditional design. Provocative design aims to challenge existing norms and attitudes through hypothetical or utilitarian designs that expose assumptions and provoke discussion (Bardzell et al., 2012). Most well known among these approaches is critical design, which uses hypothetical objects to challenge unquestioned socio-cultural norms (e.g., see Teddy Bear Blood Bag Radio by Dunne and Raby) (Dunne & Raby, 2013). In addition, adversarial design uses provocative design principles to address political issues (e.g., see Project ZAPPED! by Heidi Kumao) (DiSalvo, 2012), and discursive design uses utilitarian objects embedded in discourse to communicate ideas such as racial intolerance or world hunger (e.g., see Hug salt and pepper shaker by Mint) (Tharp & Tharp, 2013). Finally, reflective design focuses on stimulating reflection on unconscious values through technologies embedded in computing devices (Sengers et al., 2005). In short, we use the term "provocative design" to refer to design approaches that operate in a design space where asking questions is as important as solving problems.

Despite offering fruitful ground for addressing social, political, and technological challenges faced by contemporary society, the work on provocative design offers little information about the process of designing for provocation. Mostly, the focus of provocative design lies with the subject of design rather than the process of designing (Bardzell & Bardzell, 2013; Bardzell et al., 2012). For instance, Dunne and Raby (2013) clarify the main goals of critical design and provide many inspiring design examples, but they rarely provide reference to the theory and decisions that informed these examples. Therefore, engaging with provocative design can be very challenging for those who are inspired by it, but do not have a background or training in realizing their intentions. Bardzell and Bardzell (2013) have stated that developing tools and methods for critical design can support its broader adoption. Following this, preliminary guidelines and tactics have been developed to support designers in analyzing critical designs (Ferri et al., 2014; Bardzell, Bardzell, & Stolterman, 2014).

The goal of this paper is to propose design strategies that can be used to intentionally trigger dilemmas as a way of provocation. Provocative design often evokes dilemmas. For instance, Dunne and Raby (2013; p. 89) refer to critical design as way of highlighting dilemmas that can challenge existing belief systems (also see Malpass, 2013; p. 341). Consider, for example, Umbrellas for the "Civil but Discontent" Men in Figure 6.1. This product combines the symbolic form of a gentleman's umbrella with the form of a sword. This combination suggests a choice between meeting social expectations and being a sword-bearing man, which may represent a dilemma between acting in a civil manner and acting aggressively. In reality, the design may hardly encourage aggressive behaviors. However, through surfacing such a dilemma, it may indeed stimulate contemplating society's expectations about civilized people. Many examples of provocative design seem to trigger dilemmas to raise awareness about a topic of interest. Therefore, we propose that identifying strategies for triggering dilemmas can support designing for provocation. Here, we broadly define design strategies as prompts for mental exercises that can support associative thinking and seeing alternative solutions in idea generation.

Figure 6.1. Umbrellas for the "Civil but Discontent" Men by Bruce and Stephanie Tharp for Materious (photo: Courtesy of the designers)

In this paper, we focus on designing to trigger *personal* dilemmas (i.e., dilemmas that involve individual goals or values), and define them as the realization that one cannot simultaneously engage in two behavioral alternatives (Ozkaramanli, Desmet, & Özcan, 2016; Chapter 2 of this thesis). For instance, one cannot indulge in sweets, and at the same time, expect to lose weight. Such mutually exclusive choices are guided by contradictory desires, motives, or personal values; what we refer to as conflicting concerns. Being marked by indecision and doubt, dilemmas may feel uncomfortable; however, they also serve an important purpose: Hesitation is a way for the brain to slow down mental processes to collect information in order to make better choices (Fleming, 2014). In line with this, products that trigger dilemmas may disrupt or slow down decision making in favor of making informed decisions. Here, we define triggering dilemmas as the intention to raise awareness about conflict among personal concerns through designed products and services that engage the user in a "stop and think" type of behavior.

We used a bottom-up approach to understand how design can trigger dilemmas. For this, we formulated two research questions: (1) What are the qualities of products that (intentionally) trigger dilemmas? And (2) what are the strategies designers can use to trigger dilemmas? To address the first question, we analyzed designs that seem to trigger dilemmas in collaboration with two design researchers, which resulted in three main categories. For the second question, we examined how an understanding of these categories could contribute to generating ideas through design workshops conducted with fifteen novice designers. Answering these research questions can contribute to the emerging literature on demystifying provocative design, which may be particularly valuable in contexts where this approach is not intuitively used. We conclude with a general discussion on the overlap between designing to trigger dilemmas and designing for provocation.

Exploration of designs that trigger dilemmas

Sixty examples have been collected as input for an analysis session from literature, design blogs, and student projects. Forty of these examples were utilitarian design objects. In addition, we included examples from conceptual art (e.g., Fur Tea Cup by Meret Oppenheim), critical design (e.g., the Hypothetical Lunch Box by Dunne and Raby), and graphic design (e.g., Children Smoking with Adult Arms by Chi and Partners for the Roy Castle Lung Cancer

Foundation) to support a richer discussion. We selected examples that seemed to trigger dilemmas (i.e., emphasized a potential conflict between personal concerns) and that were supported by a description as communicated by the designer or the artist. These examples were organized in the form of cards with a picture, a short description, and the triggered dilemma as input for an expert evaluation.

Expert evaluation

The first author analyzed the collected examples in collaboration with two design researchers, whose expertise were on sources of inspiration in design creativity and the influence of designers' intentions on the aesthetic perception of products.[2] The main goal of this analysis was to eliminate those examples that did not explicitly trigger a dilemma, and to discuss the mechanisms through which the remaining examples triggered dilemmas.

In the first part of the session, the experts (including the first author) individually categorized the examples according to four design criticality tactics proposed by Ferri et al (2014).[3] These tactics aim to support analyzing critical design objects at varying abstraction levels such as reading semantic cues. Because of this, they could provide a solid starting point for discussion. The experts were asked to focus on the following two questions during analysis:

1. Does this example trigger the dilemma specified? If not, does it trigger another dilemma? If not, discard the design.
2. Does this example fit one of the design criticality tactics? If so, which one? If not, put the card aside to be discussed at the end of the session.

The second part of the session involved a discussion about the similarities and differences among the categorizations of experts. This discussion was facilitated by the first author, who asked about the points of agreement and disagreement among experts' categorizations. As a result of this discussion, all experts agreed to

2 Dr. Da Silva Cardozo and Dr. Goncalves contributed to the expert evaluation with their expertise in aesthetics of design ideas and design creativity, respectively.

3 In contrast to design strategies, which focus on the significant behaviors of designers when ideating, the term "design tactic" refers to a specific organization of significant elements in a designed object. In the case of Ferri et al (2014), design tactic refers to a specific organization of semantic elements in critical design objects (G. Ferri, personal communication, 24 November 2015).

exclude the following types of examples from further analysis: (1) Eight examples that were not considered provocative and that did not trigger a dilemma; (2) conceptual art and graphic design examples (both experts commented that possible strategies that can underlie the creation of such work would not be relevant for creating design objects with utility); and (3) ten examples that were considered as provocative designs, but they were not thought to trigger a dilemma beyond raising the question "Do I, as a user, agree with the meaning this product is trying to convey?" For the remaining twenty-eight examples, all experts agreed that they could trigger dilemmas in ways that merit further analysis. Table 6.1 outlines the results of analyzing the examples with an anchor example for each group.

Table 6.1. Analysis of design examples based on their potential for provocation and for triggering a dilemma

Number of cards	Explanation	Example	Image
8	Examples that do not trigger a dilemma	Tank you by Thierry d'Istria for La Tête au Cube: A vase that embodies the opposing concepts of love and war (photo: Courtesy of La Tête au Cube)	
10	Conceptual art and graphic design examples	Dead Star by Michel de Broin: An installation that is made out of "finished" batteries.	
14	Provocative design examples that raise a question but do not trigger a dilemma	Ta Ta Top: A bikini top that aims to promote questioning society's expectations from women (photo: Courtesy of Ta Ta Top)	
28	Design examples that trigger a dilemma	Thrive Portionware by Sally NG: A series of kitchenware that subtly encourages people to eat less (photo: Courtesy of the designer)	

Three categories of products that trigger dilemmas

The twenty-eight design examples exemplify the type of products that trigger dilemmas; however, they say little about the design approach taken to create such convincing examples. To understand how design can trigger dilemmas, the experts also analyzed the behavior of these examples based on the way they address conflicting personal concerns. This yielded three distinct categories, which are described as follows and illustrated in Figure 6.2 with examples:

1. Embodied symbols: Objects that embody symbols or clues that can represent conflicting concerns.
2. Forced choice: Objects that force the user to make a choice between two behavioral alternatives that cannot be carried out at the same time.
3. Behavior barrier: Objects that form a barrier to one of the behavioral alternatives, which is often the habitual or the automatic choice by the user.

Sugar Gun Lollipop (see Figure 6.2) carries a metaphor, "eating sugar kills". Here, the gun may symbolize a short life (a consequence of being unhealthy) whereas sucking on a lollipop may symbolize enjoyment. By combining these two symbols, this product can trigger thinking about conflicting personal concerns, such as the conflict between health and enjoyment. In addition, Dilemma (see Figure 2) is a table piece that can be used as a fruit bowl or a cake plate, which presents two alternative ways to enjoy food: eating healthily or indulging. Here, the design requires the user to make a choice between two behavioral alternatives (i.e., assembling the product as a fruit bowl or as a cake display) without suggesting the "better" alternative. Finally, KitchenSafe (see Figure 2) is a lockable jar that aims to prevent people from accessing tempting objects (e.g., candies, smartphone) for a desired amount of time, programmed by the user. By forming a barrier to a habitual or automatic action, such products can raise awareness about unquestioned choices (e.g., temptations) that rule everyday life.

Category 1: Embodied Symbols: Sugar Gun Lollipop by Marije Vogelzang (photo: Patricia Schimmel. Courtesy of the designer)

Category 2: Forced Choice: Dilemma by Dean Brown for Fabrica (photo: Shek Po Kwan. Courtesy of the designer)

Category 3: Behavior Barrier: KitchenSafe by TheKitchenSafe (photo: Courtesy of the designer)

Figure 6.2. Three categories of products that can trigger dilemmas

Generating design ideas to trigger dilemmas

The expert evaluation revealed that design could trigger dilemmas in, at least, three distinct ways (i.e., embodied symbols, forced choice, behavior barrier), which support better understanding this particular design intention. We suggest that an understanding of these categories can be helpful in generating ideas to trigger dilemmas, in a context in which it is, in fact, counterintuitive to do so. Therefore, we implemented the categories in a series of ideation sessions with fifteen "unprovocative" designers, i.e., designers who have been trained mainly as creative problem solvers with a structured and methodological approach to designing.

As input for the ideation sessions, we (the authors) envisioned the steps that would be necessary to deliberately create design ideas for each category of products. Using backward thinking, we formulated active descriptions that can stimulate new ideas. For this, we emphasized the nuances between the ways each category tackled dilemmas. For instance, we observed that products that embody symbols, such as Sugar Gun Lollipop, stimulate reflection about conflicting personal concerns (i.e., health vs. enjoyment), but do not necessarily require the user to act upon these thoughts. In contrast, the second and the third categories (forced choice and behavior barrier, respectively) require making a choice among behavioral alternatives, which may link action to reflection. In line with these observations, we formulated the following preliminary strategies:

1. Embodied symbols: Brainstorm about **symbols** for each concern in a dilemma, and embody them in an object by modifying one or more of the following: form, function, materiality, interaction, or use context.
2. Forced choice: Brainstorm about **possible choices** in a dilemma, and create a product that **alternates** between mutually exclusive behaviors.
3. Behavior barrier: Brainstorm about **possible choices** in a dilemma, and choose a "habitual" or "automatic" choice. Create a design that acts like a **barrier** to this choice, while, to some extent, preserving the possibility of achieving it.

The preliminary strategies suggest that choosing appropriate symbols can facilitate creating products for the first category, while the second

and third categories necessitate a set of behavioral choices as input. Therefore, we envision these categories to be used in combination with a mind-mapping exercise, during which the participants can brainstorm about appropriate symbols and behavioral choices.

Aim and procedure

To refine and to further develop the preliminary design strategies, we conducted ideation sessions with fifteen participants who had similar levels of design experience. All participants were either alumni or master level graduate students at the faculty of Industrial Design Engineering at Delft University of Technology. The participants were familiar with the approach of designing with dilemmas; however, the topic of triggering dilemmas was new to them. Four sessions were conducted in groups of three to five participants to enable in-depth discussions. Each session lasted approximately three hours.

One day before the workshop, participants received an email about the agenda of the session and two design briefs to choose from. The first brief was about promoting condom use to prevent transmission of sexually transmitted infections (see Baele, Dusseldorp, & Maes, 2001). The second brief was about promoting balanced smartphone usage (see Harmon & Mazmanian, 2013). Each design brief included an explanation of the dilemma relevant for the brief and illustrated on the framework of dilemmas (Ozkaramanli, Desmet, & Özcan, 2016; Chapter 2 of this thesis) (see Figure 6.3a and 6.3b).[4] Both design briefs were phrased in an open-ended way to allow autonomy in specifying situations where triggering dilemmas might be appropriate.

In the sessions, the participants were first introduced to the phenomenon of dilemmas and the three categories of products that can trigger dilemmas. As the categories could be unfamiliar (and rather complex), the participants were asked to group a variety of design examples under the given categories to clarify the nuances among them. Next, the participants were asked to explore the dilemma

4 The development of this model is based on the phenomenological study reported in Chapter 5. Therefore, for a more detailed understanding of this model, please refer to Chapter 5. Also note that 'model of dilemmas for designers' was termed as 'framework of dilemmas' in later stages of this PhD project.

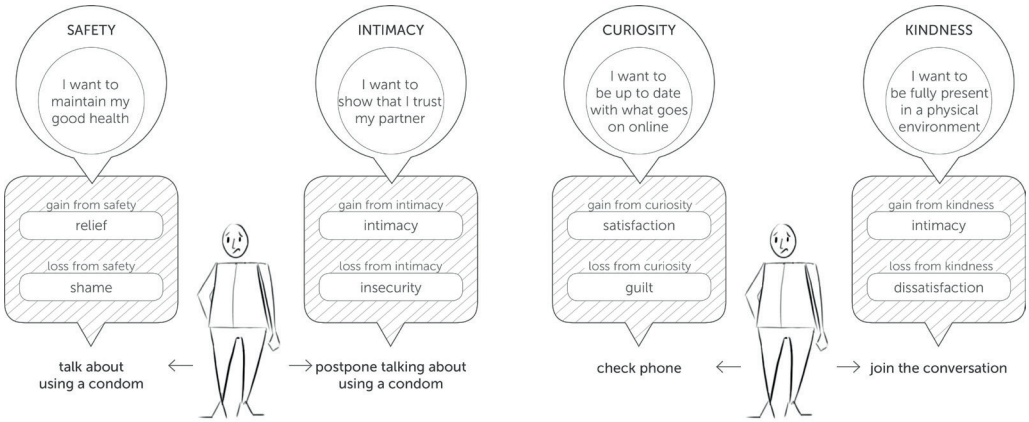


Figure 6.3. Two models that illustrate the dilemmas relevant for the two design briefs: (a) On the left: conflict between safety and intimacy related to condom usage; and (b) on the right: the conflict between curiosity and kindness related to smartphone usage

in the design brief of their choice by creating guided mind-maps.[5] For this, they were asked to create two types of mind-maps: one for symbols representing conflicting concerns (e.g., having safe sex vs. trusting my partner) and one for mutually exclusive choices that correspond to the conflicting concerns (e.g., talking about using a condom vs. ignoring the topic).

Finally, participants were asked to create ideas by using ingredients of the mind-maps and by incorporating their understanding of the categories. To facilitate analysis of ideas, an ideation template was used on which the participants could describe their ideas and the approach they used to create them. The participants were asked to create as many ideas as possible, prioritizing variety and originality more than feasibility. Following idea generation, the participants presented some of their ideas and discussed how they experienced the process of designing to trigger dilemmas.

Analysis

The participants generated fifty-seven ideas in total. Nine ideas were discarded from analysis since they were unclear or unfinished. Remaining forty-eight ideas were categorized according to the three preliminary design strategies the participants intended to use. In addition, all discussions were voice-recorded and transcribed as

5 Here, we would like to differentiate between open mind-maps, i.e. those where the designers decide what the central concepts to brainstorm about are; and guided mind-maps, i.e. those where the central concept and possibly some of the branches are pre-defined by the researchers.

input for analysis. The information on the transcripts and the idea sketches, supported by the comments on the ideation templates, were analyzed with a focus on the opportunities and challenges of using the preliminary design strategies in ideation.

Findings

We structured our findings using two main information sources: reflections of the participants on their own ideation process and evaluation of the final design ideas.

Reflections on the ideation process

All participants mentioned that triggering dilemmas was an interesting design intention, yet they also found it very challenging to implement. One participant phrased this challenge as follows: *"Although I thought I am not really a problem solver, I went into problem solving immediately. Now I realize that this approach is about taking different perspectives rather than choosing one perspective to follow."* In addition, fifteen ideas, despite being interesting, intended to resolve dilemmas instead of triggering them. For instance, seven participants thought about the same idea of underwear with a secret pocket for condoms to make them easily accessible when needed. During discussions, the participants acknowledged that such underwear might indeed promote using condoms, but might not provoke questioning the topic through triggering dilemmas.

The mind-maps helped generating the necessary ingredients for implementing the preliminary design strategies. Specifically, the participants talked about four main benefits: (1) Structuring thoughts: *"The mind-maps helped me to structure what my opinion about this design brief is."* (2) Increasing efficiency: *"Creating the mind-maps seems time consuming, but when it speeded things up when creating ideas."* (3) Finding inspiration: *"Especially the symbols mind-map was really helpful. I was already drawing on the mind-map, and it was easy to get ideas out of there."* (4) Broadening the mind-set: *"I was not really brainstorming about phone usage. Instead, I was brainstorming about stimulation vs. mindfulness and that helped me to be more open minded."* Four participants noted that the fourth benefit could also be a disadvantage, since freely brainstorming about symbols or situations could disengage their thoughts from the focus of the design brief: *"The jump from the mind-maps to creating ideas was a big one for me; I felt*

that I missed something, like contextual information, that could connect the ingredients on the mind-map in a meaningful way."

Figure 6.4 and Figure 6.5 illustrate example mind-maps created by the participants. Figure 6.4 shows a mind-map that explores the conflict between curiosity (e.g., check smartphone) and kindness (e.g., ignore

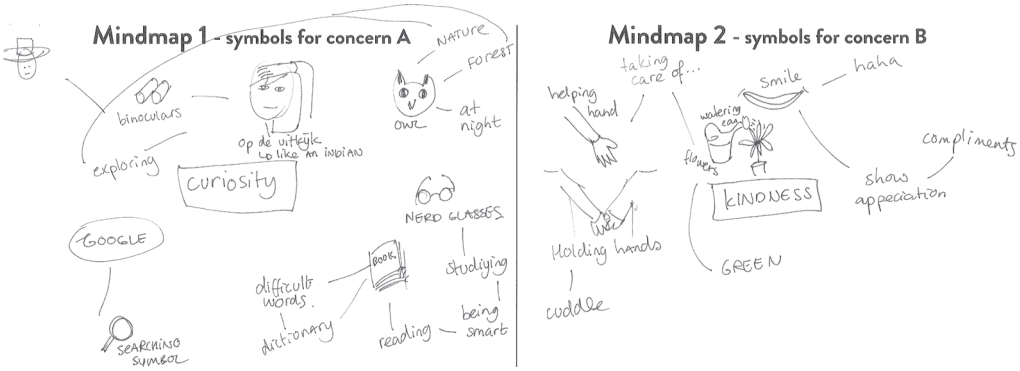


Figure 6.4. Mind-map that explores symbols for the conflict between curiosity (e.g., check smartphone) and kindness (e.g., ignore smartphone)

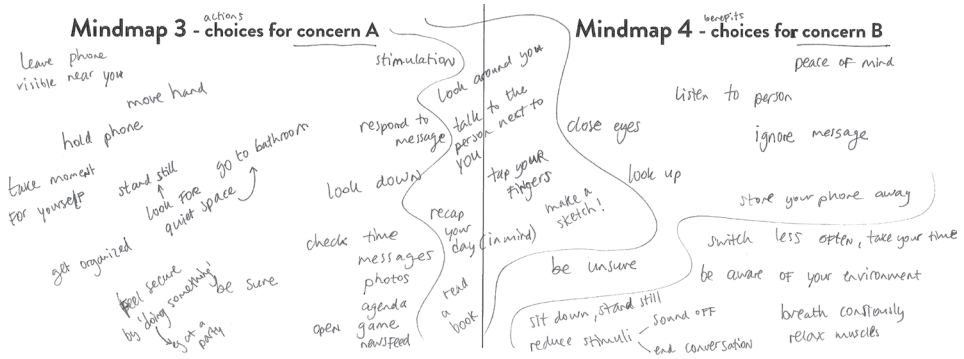


Figure 6.5. Mind-map that explores possible choices for the conflict between stimulation (e.g., check smartphone) and mindfulness (e.g., ignore smartphone)

smartphone) through brainstorming about the *symbols* representing each concern. Figure 6.5 shows a mind-map that explores the conflict between stimulation (e.g., check smartphone) and mindfulness (e.g., ignore smartphone) through brainstorming about *possible choices* that can fulfill each concern.

Twelve out of fifteen participants mentioned that using the categories as a starting point for ideation blocked their creativity and commented that the "real" inspiration came from the exercise they did with the categories (i.e., embodied symbols, forced choice, behavior barrier): "*When I tried to pick a strategy to go on with, it was not working. It was too rational. The description of the categories helped me to understand how it works or to check whether my ideas are good or bad. But what worked best was the mind-maps in combination with the exercise we did with categorizing different products.*" Another designer, who was aware of her personal preferences in generating ideas, said: "*Well, I decided that I will not look at the strategies when I start. I will first create ideas and when I get stuck, or when I have some ideas, I will go back to the strategies to analyze where they fit, and to come up with more ideas or to improve the ones I have.*" Moreover, the designers who did start ideating using the strategies mentioned that it was frustrating to start thinking about one category and to end up with ideas for another: "*I wanted to do something for the first category, but when I had an idea, I immediately started thinking 'is this the right category?'* "

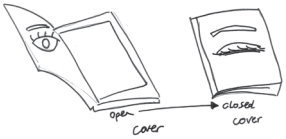
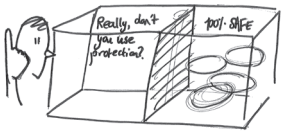
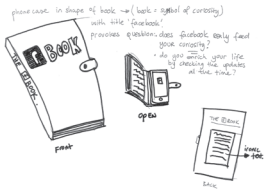
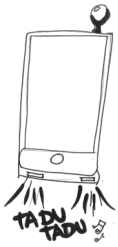
Evaluation of the final design ideas

To better explain insights gained from the evaluation of participants' ideas, we will refer to six design ideas generated in the sessions and presented in Table 6.2.[6]

Nine out of fifteen participants considered the first strategy to be very interesting, but challenging to implement in the way it was presented. For instance, Sleeping Phone (Table 6.2) is a suitable example for this category because it symbolizes alertness (i.e., checking phone) and relaxation (i.e., ignoring the phone) in one product. However, we observed that it is important to think flexibly about combining symbols that represent conflicting concerns. The Facebook Book (Table 6.2), for instance, combines a real book that symbolizes "constructive"

6 The names of the workshop participants who generated the ideas in Table 2 have not been mentioned to protect anonymity.

Table 6.2. Six design ideas generated in the ideation sessions

Category 1 (Embodied symbols)	Category 2 (Forced choice)	Category 3 (Behavior barrier)
		
Sleeping Phone Smartphone cover that displays a sleeping eye when closed; and an awake eye when open.	Love Counter A transparent storage box in which one can keep packaged condoms in one compartment and part of the packaging from used condoms in another.	Breathing Phone A smartphone phone gadget that requires you to breathe slowly and consciously into a tube in order to unlock your phone.
		
Facebook Book A phone case in the shape of a real book, with title, Facebook.	Open Me Condom packaging that only opens on one side, while the other side has pictures of people with a sexually transmitted infection.	Ta-Du Phone A smartphone application that, when programmed, makes annoying noises when one takes his smartphone out of his pocket in a social setting.

curiosity, with the Facebook logo that symbolizes "destructive" curiosity to provoke the question *"does Facebook genuinely feed people's curiosity?"* On the ideation sheet, the participant noted, *"I used two symbols, but both are related to the concern for curiosity, and none to the concern for kindness. I am really confused now."* Although the participant was satisfied with his idea, he could not rationalize using the first strategy. This remark indicates that designers can refer to the strategies if and when they are needed, instead of following them as a sequence of steps.

The second strategy received little attention from the participants compared to the others. This could be due to the challenge of

suspending one's moral judgment when designing, which may particularly be challenging when the "right" choice seems clear (i.e., using a condom). For example, Love Counter (Table 6.2) does not imply that using a condom is the "right" (or "wrong") action. Instead, it enables the user to track the consequences of both actions. In contrast, Open Me, implies what the "right" choice is, which was apparent in many ideas based on the second strategy.

Using the third strategy enabled the participants to communicate what they thought the "right" choice was. However, when using this strategy, they found it challenging to identify subtle barriers that would not be perceived as an annoying punishment by the users. For instance, the participant who created the Ta-Du Phone (Table 6.2) commented that he would never want a phone like that himself. However, the participants who discussed the Breathing Phone (Table 6.2) thought that breathing slowly and consciously before using a smartphone could be a subtle yet provocative barrier. This might explain why the third strategy was used most frequently, while at the same time, many participants mentioned that it was their least favorite strategy.

Discussion

Our findings indicate that triggering dilemmas as a means to design for provocation is a different challenge than finding a creative way to deal with users' personal dilemmas. Designers who are trained to take deliberate design decisions (defining a target group, a design context, or a clear design goal) may find it uncomfortable to delay these decisions or leave them to the interpretation of the users. In contrast, much of provocative design seems, often by the virtue of their ambiguity, to take comfort in allowing for multiple interpretations by users (Gaver, Beaver, & Benford, 2003). It might have been helpful to further emphasize the essence of this design intention by, for example, engaging the participants in a debate or a role-playing exercise about the design brief prior to the ideation session. Such exercises might have facilitated the sensitive mind-set of taking different perspectives and stalling moral judgment.

The ideation sessions broadened our knowledge on the nature of the design strategies that can be helpful in ideation when designing to trigger dilemmas. Bardzell et al (2012) identified several challenges that can influence the critical design process, one of which is about operationalizing critical theory: "Making the leap from descriptive

[critical theory] to generative [designing], the designer must make judgments about how to proceed." (Bardzell et al., 2012; p. 293; brackets added). This has proved to be a challenge in our work as well: our experience shows that designers need a "bridge" between "understanding a dilemma" and "the act of triggering dilemmas". However, as the word "strategy" may suggest, these strategies need not be concrete, step-by-step instructions similar to those in a recipe book. Neither do we suggest that abstract goals such as "design for provocation" or "trigger a dilemma" can provide a bridge between understanding and generating. Similar to strong concepts proposed by Höök and Löwgren (2012), we envision design strategies to reside on an abstraction level that transcends particular instances while maintaining a generative value. In the context of designing to trigger dilemmas, we define design strategies as a set of creative exercises that can facilitate reflection in action and being sensitive to different perspectives on the subject of design, while suspending moral judgment.

We argue that this extended definition of design strategies can work well due to the involvement of three main mental activities during ideation: *understanding, recognizing*, and *generating* (see Chi, 2009). For instance, the descriptions of the product categories helped *understanding* principles that define these categories, classifying various product examples under different categories helped *recognizing* them, and redesigning those examples to fit under different categories helped *generating* new design ideas. More importantly, our findings have shown that designers engage in these mental activities in an iterative fashion (vs. a linear, consecutive fashion). In fact, starting the ideation with a specific category in mind did not necessarily led to generating new ideas, whereas techniques such as redesigning a rough idea using the principles from different categories, or using the categories as a lens to analyze first ideas, worked better. This active participation of designers in building the strategies they use to generate ideas resembles the central element of constructivist learning theories (Fosnot & Perry, 1996), which, in future research, may form the basis for developing new techniques that can support ideation in the context of designing for provocation.

An important limitation of the ideation sessions should be mentioned. Both the design briefs and the design approach being proposed were new to the participants, and thus, allowing more time to understand

and implement the input; for instance, in ideation sessions with multiple-stages, could have been a more fruitful research format.

General discussion

The promise of provocative design approaches has often been neglected in traditional product design mainly due to the resulting objects being considered as art and lacking a utilitarian function expected of traditionally designed objects (Malpass, 2015). Therefore, designing to provoke reflection and debate has become an established practice only at few universities such as Royal College of Art, Central Saint Martins, and Design Academy Eindhoven, where it gradually acquired its privileged nature as a practice reserved for the distinct few (Bardzell et al., 2013). Reasonably, if we had conducted the ideation sessions with students or alumni of these institutions, our findings would have been drastically different. However, we believe that designers who are trained in a problem-solving tradition can also benefit from strategies that can support them in designing for provocation. Such strategies can broaden the repertoire of their design thinking and stimulate creativity and willingness to consider the ethical implications of their design intentions. In addition, the increasingly interdisciplinary nature of design and its ambition to deal with complex societal issues have broadened the definition of function in design. This development seems to make provocative design approaches more relevant to traditional design than they may have ever been.

In this paper, we argued that triggering dilemmas might be a means to designing for provocation. The two approaches have both similarities and differences. First, a common aim for provocative design is to challenge *socio-cultural* norms, values, and assumptions, in order to cultivate *social awareness*, whereas, triggering dilemmas focuses on *personal* desires, norms, values and aspirations, in service of *self awareness*. Second, even though provocative design, particularly critical design, takes inspiration from everyday objects, it does not usually result in designs that are bought and used by a general audience. In contrast, we intend products that trigger dilemmas to be utilitarian and embedded in everyday life. We argue that their repeated usage, which may invite interpretation, discussion, and reflection, can be a strength for such products. Third, triggering dilemmas is only one way of designing for provocation, where other means are possible such

as creating curiosity and engagement through ambiguity. Because of this, experts who participated in the research categorized some of the products as "provocative designs that do not trigger a dilemma". These products do embody arguments and ideas, but these ideas do not necessarily represent personal dilemmas.

Finally, we provided insights on the nature of design strategies that can be used to generate ideas to trigger dilemmas. Specifically, we aimed to contribute to the dynamics of ideation and utilized the ingredients of dilemmas (e.g., conflicting concerns and mutually exclusive behavioral alternatives) to formulate preliminary design strategies. The way we defined design strategies, i.e., creative exercises that facilitate perspective taking and stalling moral judgment, can be extended. For instance, Gaver et al (2003) identified three types of ambiguity (information, context, and relationships) and proposed several strategies for each (e.g., point out things without explaining why). In addition, Ferri et al (2014) proposed the design criticality tactics, namely thematic blending, semantic shifts, social transgression, and body modification, which can be used to analyze critical designs. Such tactics may also be of great value in ideation as they extend the understanding of the behavior of provocative design examples. Therefore, studying the generative value of these tactics is an interesting direction for future research.

References

Baele, J., Dusseldorp, E., & Maes, S. (2001). Condom use self-efficacy: Effect on intended and actual condom use in adolescents. *Journal of Adolescent Health, 28*(5), 421–431.

Bardzell, J., & Bardzell, S. (2013). What is critical about critical design? In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems: Changing Perspectives,* Paris (pp. 3297–3306). New York: ACM Press.

Bardzell, S., Bardzell, J., Forlizzi, J., Zimmerman, J., & Antanitis, J. (2012). Critical design and critical theory: The challenge of designing for provocation. In *Proceedings of the Designing Interactive Systems Conference: In The Wild,* New Castle (pp. 288–297). New York: ACM Press.

Bardzell, J., Bardzell, S., & Stolterman, E. (2014). Reading critical designs: Supporting reasoned interpretations of critical design. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems: One of a CHInd,* Toronto (pp. 1951–1960). New York: ACM Press.

Chi, M. T. (2009). Active-constructive-interactive: A conceptual framework for differentiating learning activities. *Topics in Cognitive Science, 1*(1), 73–105.

DiSalvo, C. (2012). *Adversarial Design.* MIT Press.

Dunne, A., & Raby, F. (2013). *Speculative Everything: Design, Fiction, and Social Dreaming.* Cambridge, MA: MIT Press.

Ferri, G., Bardzell, J., Bardzell, S., & Louraine, S. (2014). Analyzing critical designs: Categories, distinctions, and canons of exemplars. In *Proceedings of the 2014 conference on Designing interactive systems: Crafting Design,* Vancouver (pp. 355–364). ACM Press.

Fleming, S. (2014). Hesitate! Indecision is sometimes the best way to decide, *Aeon Magazine.* http://tinyurl.com/lmnu47f, (Accessed 7 November, 2015).

Fosnot, C. T., & Perry, R. S. (1996). Constructivism: A psychological theory of learning. *Constructivism: Theory, Perspectives, and Practice,* 8–33.

Gaver, W. W., Beaver, J., & Benford, S. (2003). Ambiguity as a resource for design. In *Proceedings of the SIGCHI conference on Human factors in computing systems: New Horizons,* Florida (pp. 233–240). New York: ACM Press.

Harmon, E., & Mazmanian, M. (2013). Stories of the smartphone in everyday discourse: Conflict, tension and instability. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems: Changing Perspectives,* Paris (pp. 1051–1060) New York: ACM Press.

Höök, K., & Löwgren, J. (2012). Strong concepts: Intermediate-level knowledge in interaction design research. *ACM Transactions on Computer-Human Interaction (TOCHI), 19*(3), 23–41.

Malpass, M. (2013). Between Wit and reason: Defining associative, speculative, and critical design in practice. *Design and Culture, 5*(3), 333–356.

Malpass, M. (2015). Criticism and function in critical design practice. *Design Issues, 31*(2), 59–71.

Ozkaramanli, D., Desmet, P. M. A., & Özcan, E. (2016). Beyond Resolving Dilemmas: Three Design Directions for Addressing Intrapersonal Concern Conflicts. *Design Issues, 32*(3), 78–91.

Roozenburg, N. F., & Eekels, J. (1995). Product design: Fundamentals and methods (Vol. 2). Chichester: Wiley.

Sengers, P., Boehner, K., David, S., & Kaye, J. J. (2005). Reflective design. In *Proceedings of the 4th Decennial Conference on Critical Computing: Between Sense and Sensibility,* Aarhus (pp. 49–58). New York: ACM Press.

Tharp, B. M., & Tharp, S. M. (2013). Discursive design basics: Mode and audience. In *Proceedings of Nordic Design Research Conference: Experiments in Design Research,* Copenhagen (pp. 406–409).

PART C

Implementation & Discussion

"You know, you are a little complicated after all."

"Oh no," she assured him hastily. "No, I am not really – I'm just a – I'm a whole lot of different simple people."

- F. Scott Fitzgerald, Tender is the Night, book 3, chapter 8, p. 375

Part A and Part B of this thesis offered the necessary knowledge base for addressing dilemmas through design, supported by design aids to facilitate implementing this knowledge in design activities. As a result, chapters in Part A and Part B covered study 1 through 6 and addressed six research questions proposed in the introduction (see Table 1.1).

Part C is composed of the final two chapters of this thesis. Chapter 7 is intended as an integration chapter, where the knowledge, methods, and tools discussed in the previous chapters are integrated into the design process. The first part of this chapter gives an overview of the knowledge and methods introduced in the previous chapters. The second part addresses the seventh research question in Table 1.1, which is *what are the opportunities and challenges involved in designing with dilemmas?* Thirty novice designers responded to a design brief in three consecutive workshops (Study 7). Based on the reflections of the designers and the outcome of the workshops, Chapter 7 outlines five main challenges encountered when designing with dilemmas, and gives recommendations on how to overcome these challenges.

In Chapter 8, the final chapter, the main findings of this thesis are discussed with respect to the research questions introduced in Chapter 1 (Table 1.1). Chapter 8 also outlines the main conclusions and limitations of this research, draws implications for design students, professionals and product users, and suggests directions for future research.

CHAPTER 7

From identification to ideation: Incorporating personal dilemmas in the design process

Abstract

Personal dilemmas, or intrapersonal concern conflicts, are inspiring phenomena that can positively drive the design process. The aim of this chapter is to integrate the knowledge, methods, and tools discussed in the previous chapters into a coherent overview of dilemma-driven design and to understand the main challenges and opportunities involved in designing with dilemmas. In the first part of this chapter, three main activities performed when designing with dilemmas are explained. These activities are identifying dilemmas (*discovery*), selecting a target dilemma (*definition*), and generating ideas to address the selected dilemma (*application*). In the second part, a design case is described in which thirty novice designers responded to a design brief in three consecutive workshops. Based on designers' reflections, the main challenges and opportunities of designing with dilemmas have been identified and recommendations for tackling each challenge have been suggested.

Introduction

Focusing on conflicts is a powerful way to enhance creativity in the design process. Benack, Basseches, and Swan (1989) suggested that conflict between two elements (e.g., design requirements) is a rich source of creativity because it stimulates the elimination of conflicts to restore balance. In line with this, Cross (2003) stated that a characteristic of exceptional designers is to utilize conflicts between the features of an object and user's requirements to come up with creative ideas. Recognizing the creative value of the concept, several engineering design methods explicitly focus on the management of conflicts in the design process. Most notably, Theory of Inventive Problem Solving (TRIZ) (Mann, 2001) helps to identify conflicting technical requirements and proposes forty inventive principles to resolve them. These studies indicate that conflicts can be used methodically to stimulate creativity in the design process.

The concept of conflict has also attracted attention in user-centered design. For instance, Hekkert and van Dijk (2011) stated that conflicts between context factors (i.e., context-related observations, theories, thoughts and so on) are good starting points for mapping a future design context when using Vision in Product Design (ViP) method. Building on ViP, Tromp (2013) proposed five steps for the Social Implication Design (SID) method, which addresses conflicts between individual and societal needs to design for behavior change. These user-centered design methods aim to address different types of conflicts, such as conflicts between research insights (ViP) or individual and societal concerns (SID).

Although the conflict-driven design thinking has been common in engineering design (i.e., TRIZ) and has also received some attention in user-centered design (i.e., SID), none of the aforementioned methods focus on conflicts between individual concerns, namely intrapersonal concern conflicts or dilemmas. Dilemmas prevail in everyday life: one may want to save money to buy a meaningful gift for another person, and yet, he may not resist the idea of spending a portion of the savings on a new outfit; or one may want to accept a promotion, and at the same time, be wary of spending less time with family. On this, Frijda (2010, p. 70) noted that conflict among concerns is "the rule in everyday life rather than the exception." Being related to important psychological processes such as decision-making and self-actualization, dilemmas often have a negative influence on the

satisfaction derived from daily choices (phenomenon called paradox of choice, see Schwartz, 2004) and on subjective wellbeing in general (see Emmons & King, 1988). As a result, ignoring user's dilemmas when designing products and services is like ignoring a crucial part of what makes users human.

In this chapter, we focus on methodically integrating dilemmas in the design process. Successful adoption of new design methods requires both an understanding of activities it entails, and an awareness of the rationale for adopting the method (i.e., usefulness, appropriateness, challenges) (Daalhuizen, 2014; see also "method mindset" by Andreasen, 2003). For instance, when implementing the steps of the SID method, one of the reported issues was the lack of criteria to meet for each step (e.g., through example projects), which complicated decision-making (Tromp, 2013). Another related challenge was that the suggested steps did not include design activities or suggestions on appropriate activities for each step, which could make it easier for novice designers to use the method (Tromp, 2013). Therefore, we argue that successful integration of dilemmas in user-centered design activities requires a set of design aids (e.g., methods, tools and techniques) that can support decision-making at various stages of the design process.

The aim of this chapter is two-fold: to offer the basic knowledge needed to incorporate dilemmas in the design process (i.e., *how* of designing with dilemmas), and to identify and discuss the opportunities and challenges encountered when designing with dilemmas (i.e., the *why* of designing with dilemmas). In the first part of this chapter, we introduce the three main activities performed when designing with dilemmas. In the second part, we present an explorative study in which we evaluated the experience of designing with dilemmas with thirty master-level design students across three half-day design workshops. Next, we discuss the opportunities and challenges involved in the process of designing with dilemmas and give recommendations on overcoming these challenges. Finally, we discuss dilemma-driven design based on literature on design thinking and propose directions for future research.

Designing with dilemmas

Ozkaramanli, Desmet, and Özcan (2016, Chapter 2 of this thesis) defined dilemmas as the experience of having to make a choice between two mutually exclusive choices that touch up on one's personal concerns, while their simultaneous realization is challenging, if not impossible. Designing with a focus on dilemmas (referred to as designing with dilemmas or dilemma-driven design from here onwards) has been implemented in a multitude of design projects, including industry briefs (e.g., Ozkaramanli et al., 2013), design workshops (e.g., Ozkaramanli, Özcan, & Desmet, 2014), and student projects (e.g., Innemee, 2014, Coehoorn, 2014; Bins, 2014). These projects involved design activities necessary to integrate dilemmas in the design process and revealed some key challenges involved in these activities. For instance, Chapter 3 of this thesis focused on the challenge of selecting a design-worthy dilemma among several dilemmas identified during user research.

Based on an analysis of dilemma-driven design cases, we identified three main activities that can focus the design process on addressing dilemmas. These are (1) discovery: identifying dilemmas relevant for a given design brief, (2) definition: analyzing all dilemmas and selecting a design-worthy dilemma, and (3) application: creating ideas that can address the selected dilemma. These activities correspond to the conceptual phase of the design process, and are meant *to complement* rather than *to replace* the activities in this phase. For instance, in the basic design cycle, the point of departure for the new design is its function (e.g., a technical, psychological, or economic function) (Roozenburg & Eekels, 1995). In dilemma-driven design, *function* implies a design that can tackle a dilemma. In addition, identifying and analyzing dilemmas correspond to the *analysis* phase of the basic design cycle, which is characterized by data gathering on the problem and specifying directions through which the solutions can be sought (Roozenburg & Eekels, 1995). Similarly, creating ideas to address a selected dilemma corresponds to the *synthesis* phase of the basic design cycle. Figure 7.1 illustrates the basic design cycle (see Roozenburg & Eekels, 1995), where the gray area illustrates the phases of the cycle in which designing with dilemmas can be integrated.

The three activities, namely discovery, definition, and application, have three characteristics that guide their adoption in the design process: (1) the output from each activity becomes the input for the next

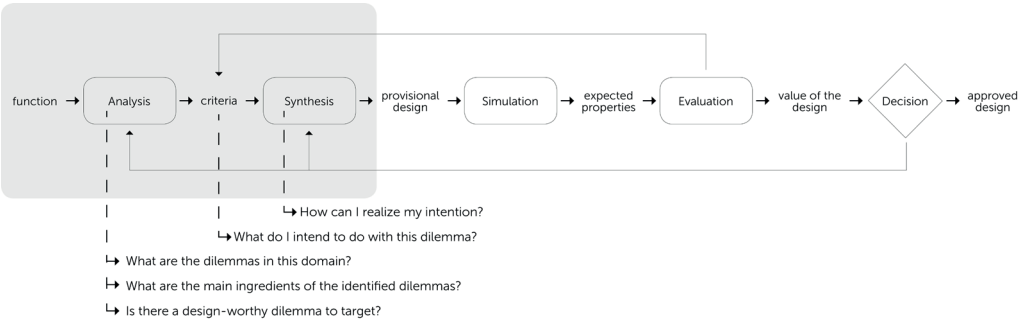


Figure 7.1. Sketch of the basic design cycle illustrating the phases in which designing with dilemmas can be integrated

activity; (2) for each activity, we suggest a question that makes the design decision to be taken explicit; and (3) each activity is supported by one or more design aids. The three activities involved in dilemma-driven design and the supporting design aids are visualized in Figure 7.2. In this illustration, the character in the blue jacket represents the designer who is the main decision-maker in this process. The dilemmas are the orange-white circles, and the design aids supporting each activity are the square figures outlined with orange contour lines.

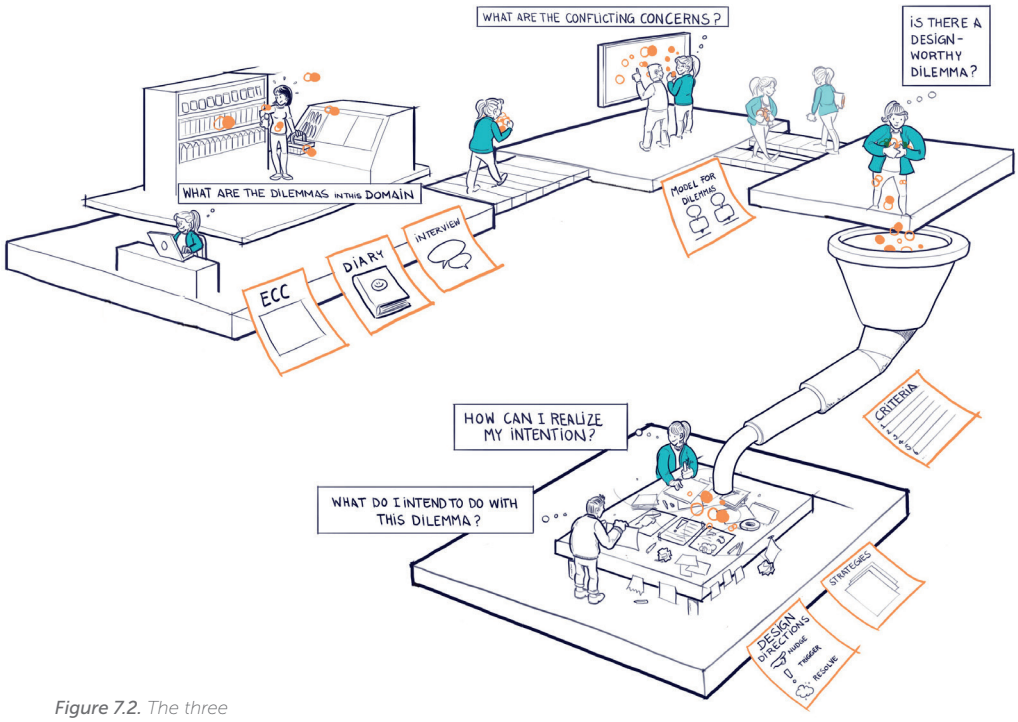


Figure 7.2. The three main activities involved in designing with dilemmas

Activity 1: Discovery What are the dilemmas in this domain?
Supporting design aids are: Emotion Capture Card procedure Experience booklets followed by in-depth interviewing Co-exploration

To use dilemmas as input for design activities, designers actively seek them in the context they intend to design for. A complication here is that people do not always have conscious access to their concerns (see Wilson, 2002). This task becomes much more challenging in the case of dilemmas, because people tend to ignore or deny conflicting thoughts as a way of maintaining consistency in attitudes or behavior (see Festinger, 1957; Bem, 1967). Ozkaramanli, Özcan, and Desmet (2014) suggested several qualitative research methods that can help access dilemmas. These are categorized as *user-centered methods,* which involve Emotion Capture Card procedure and experience booklets followed by in-depth interviewing; and *designer-centered methods,* namely co-exploration. We briefly summarize these methods in the following paragraphs.

User-centered methods

User-centered methods involve users as research participants in data collection. *Emotion Capture Card (ECC)* procedure originates from design research and has previously been applied by Ozkaramanli et al (2013). *Experience booklets* and *in-depth, phenomenological interviewing* are widely used in psychology (see Moustakas, 1994), and their combination has been previously applied in design research (see Fokkinga & Desmet, 2012).

Emotion Capture Card procedure is a two-staged experience sampling procedure that relies on self-report. In the first stage, experienced emotions in a real-life context are captured, and in the second stage, the concerns that underlie these emotions are determined through a laddering type interview (Reynolds & Gutman, 1988). The researcher notes each captured emotion on an Emotion Capture Card (ECC) as input for interviewing in the second stage. In the interview, three types of questions are asked for each card: Asking about "what happened" determines the cause of the emotion (e.g., my daughter's

school uniform had stains on it); asking, "how do you feel" determines the specific emotion participant experienced (e.g., I was angry); and asking, "why is this important?" determines the concerns underlying each emotion (e.g., she should keep her uniform clean). This procedure can result in hundreds of capture cards depending on the amount and length of the research sessions. In the analysis phase, one concern is distilled from each card, and the relationships between concerns are analyzed to identify conflicting concerns, i.e., dilemmas (see Ozkaramanli et al., 2013).

Experience booklets provide a medium for participants to record their dilemmas by answering a number of questions designed to probe these experiences. Here, the goal is to bring dilemmas into awareness. Similar to cultural probes (Gaver, Dunne, & Pacenti, 1999), experience booklets target inspirational quality rather than quantity in participants' responses. However, experience booklets are different than cultural probes or sensitizing booklets (Sleeswijk Visser et al., 2005), since they target experiences related to a specific phenomenon rather than information on general characteristics of users and their context.

Phenomenological interviewing can be facilitated by using the responses given in the experience booklet as input. According to Moustakas (1994) phenomenological interviews can be conducted in an informal, open, and interactive way, and in a setting that is natural to the participant. The fundamental question that needs to be answered in the phenomenological interview is *'what is it like to experience this specific phenomenon?'* (Englander, 2012). For dilemmas, the interviewer and the participant can go through the responses given in the experience booklet and discuss them in greater depth.

Designer-centered methods

Designer-centered methods rely on the knowledge and judgments of the design team and possibly other experts. To facilitate this, we developed the *co-exploration procedure,* which is a procedure that can be used by designers and domain experts to collaboratively formulate possible dilemmas in a specific domain. The toolkit shown in Figure 7.3 can facilitate this collaboration. This toolkit is composed of four elements: (1) an infographic of nine common dilemmas and existing design objects that can address these dilemmas; (2) a set of goal cards inspired by the goal taxonomy of Ford (1992) supported by an

infographic giving an overview of these goals (see Figure 7.4); (3) a set of product cards developed using the Google product taxonomy (see Figure 7.4); and (4) instructions on how to use the toolkit.

The toolkit works as a creativity tool typically used in brainstorming sessions and is intended to be used (at least for the first time) in the presence of a facilitator who is familiar with the toolkit. In the first step, the research team explores the infographic to acquire an understanding of dilemmas and the role of design in addressing them. Next, the team formulates dilemmas using goal cards or product cards as a starting point until they agree upon a relevant and inspiring set of dilemmas to work with.

Using goal cards: Any two goals can conflict in a situation that is relevant to both goals. For instance, the goal of maintaining good health and the goal of enjoyment may clash when you are in doubt about having dessert at the end of a dinner party. By brainstorming about possible situations in which two goals may conflict, a design team can identify potential dilemmas relevant for different situations.

Using product cards: Any product can be analyzed from the perspective of people's dilemmas. Products are designed to fulfill specific user concerns, while they may ignore or violate other concerns. For instance, a wallet is designed to keep one's money safe and organized, but it may be cumbersome to carry in the pocket of clothing. By identifying the key concerns a product can fulfill and harm, a design team can identify potential dilemmas relevant for a specific product.

As their explanations may convey, each suggested method for identifying dilemmas pose opportunities and challenges in research. We expect that the choice among these methods will largely depend on the nature of the design brief, resources of the design team, and preference for a specific type of method (user-centered or designer-centered). In some cases, the core of the design brief may be an abstract dilemma, such as addressing the conflict between career goals and family goals through design (i.e., work-life balance) (Coehoorn, 2014). In such an open-ended case, interviewing may be an appropriate method that may bring focus to the design brief. Alternatively, the design brief may involve a specific context, product,

or an experience (e.g., visiting a cemetery), which allows using an experience-sampling type of approach such as the ECC procedure (Ozkaramanli et al., 2013).

Figure 7.3. Co-exploration toolkit

Figure 7.4. Goal cards and product cards

Activity 2: Definition
a. What are the main ingredients of the identified dilemmas?
b. Is there a design-worthy dilemma to target?

Supporting design aids are:
Framework of dilemmas (for a)
Criteria for selecting a design-worthy dilemma (for b)

What are the main ingredients of the identified dilemmas?

Unraveling the ingredients of dilemmas, namely mutually exclusive choices, mixed emotions, and conflicting concerns, helps analyzing dilemmas from three different perspectives, namely the behavioral (i.e., choices), affective (i.e., emotions), and cognitive (concerns), respectively. Although the content of the specific ingredients may change based on the dilemma being analyzed, the structure of the framework remains the same. Because of this, the framework can be used as a tool to analyze and communicate different dilemmas in a coherent and comparable form within a design team or when presenting dilemmas to various stakeholders. To facilitate adoption of this framework in the design process, we formulated questions that can help its usage. These questions are shown in Figure 7.5.

Note that disentangling the ingredients of a dilemma can support analyzing and communicating dilemmas regardless of how evident each ingredient is to the person in the dilemma. In fact, beyond dilemmas that people consciously struggle with (e.g., whether to accept a job offer or not), they can also be in a dilemma without paying conscious attention to it (e.g., whether to have coffee or tea in the morning) (Kleiman & Hassin, 2011). This is because, although people have many concerns that potentially conflict, mental resources are limited to resolving conflicts within conscious awareness (Kleiman & Hassin, 2011). Therefore, when asked directly, people may not immediately recognize a certain choice as a dilemma, and self-reports on dilemmas may not always include all three components. Nevertheless, it is possible to formulate any dilemma in terms of these three ingredients using the framework of dilemmas as a guide.

Is there a design-worthy dilemma to target?

Following an in-depth understanding of each identified dilemma, the design team often starts to eliminate some dilemmas and to prioritize

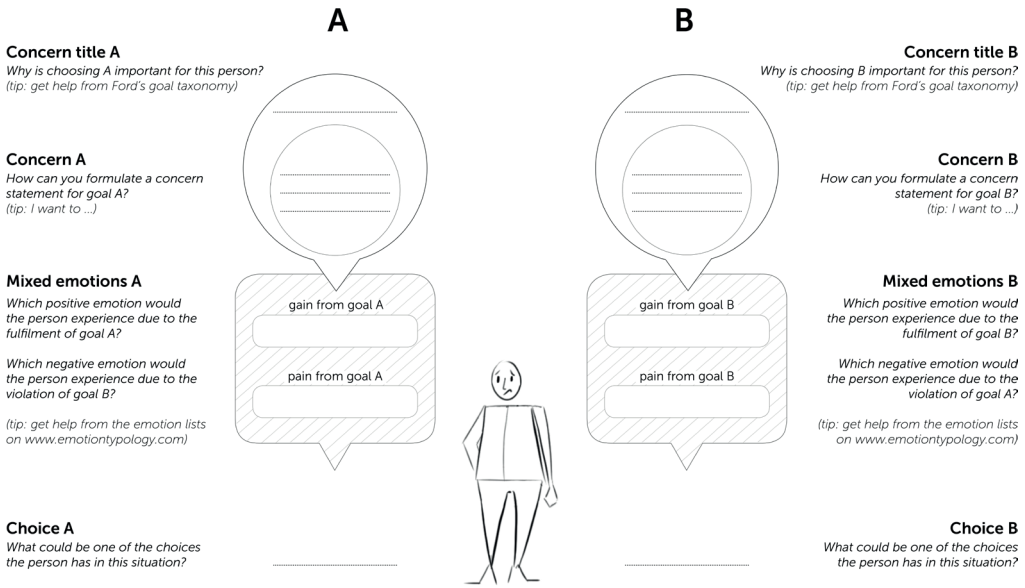


Figure 7.5. Framework of dilemmas, supported by questions that can help analyzing each dilemma

others. Analysis, selection, and ideation are iterative activities, and thus, the team does not need to select one dilemma immediately. Often, a preliminary ideation session may be conducted to let the quality of the resulting ideas determine the target dilemma. This activity can be facilitated by the following criteria: (1) *relevance,* the impact of addressing a dilemma on future users, (2) *inspiration,* the selected dilemma's potential to inspire design ideas, and (3) *meaningful formulation,* the effort to reformulate conflicting concern statements at varying abstraction levels in order to form an advantageous design space (for a detailed explanation of these criteria, see Chapter 3 of this thesis). The first and the second criteria are related to the inherent characteristics of the identified dilemma, whereas, the third criterion implies that, by consciously examining different combinations of conflicting concern statements formulated at varying abstraction levels, a dilemma can be reformulated as a relevant and inspiring starting point for ideation (for a detailed explanation of framing concerns when formulating dilemmas, see Chapter 4 of this thesis).

Activity 3: Application a. What do I intend to do with this dilemma? b. How can I realize my intention?
Supporting design aids are: Three design directions (for a) Design strategies that can help applying the design directions (for b)

Ozkaramanli, Desmet, and Özcan (2016, Chapter 2 of this thesis) suggested that designers respond to dilemmas in at least three distinct ways, which are resolving, moderating, and triggering dilemmas. Each of these design directions is further supported by design strategies, which are summarized in Table 7.1.

Table 7.1. An overview of the design directions and supporting design strategies discussed in literature

Design direction	Explanation	Supporting design strategies
Resolving dilemmas	Designers can fulfill conflicting concerns simultaneously.	*Blending* *Fixing* *Designing flexibility into the product* *Introducing new designs*
Moderating dilemmas	Designers can explicitly prioritize one concern over the other.	*Making the consequences of pursuing long-term goals or temptations tangible* *Create enablers / barriers to make long-term goals easier to pursue or to make temptations more difficult to pursue* *Add new sources of pleasure to pursuing long-term goals or new sources of displeasure to fulfilling temptations*
Triggering dilemmas	Designers can create awareness about the dilemma.	*Embodied Symbols* *Forced Choice* *Behavior Barriers*

Summary of the first section

In the first section of this chapter, we introduced the activities that can help incorporating dilemmas in the design process. These activities were identifying dilemmas (discovery), analyzing and selecting a design-worthy dilemma (definition), and generating ideas to address the selected dilemma (application). Each of these activities is supported by design aids, such as data collection methods and design strategies used in ideation. In summary, the first section formed the knowledge base for focusing on dilemmas when designing. In the next section, we present a study, the findings of which can influence designers' willingness to use dilemma-driven design by giving an overview of the opportunities and challenges this approach involves.

What to expect when designing with dilemmas

In this section, we will present a study that systematically followed the activities of dilemma-driven design. In addition to illustrating how the knowledge provided in the first section can be put in practice, this study aims to provide an overview of the opportunities and challenges dilemma-driven design entails, which can help understanding how designers experience designing with dilemmas. For this, we conducted three consecutive design workshops with master-level design students to evaluate how they incorporate the dilemma-driven design activities and the supporting design aids in their design processes.

Method

We conducted three half-day design workshops with one-week period between each workshop. Thirty master-level design students attended the workshops as part of an elective course on Emotion-driven Design at the Faculty of Industrial Design Engineering at Delft University of Technology (19 Female, 11 Male; ages between 20 and 30 years). Each workshop involved a short-lecture delivered by the workshop facilitator (i.e., author of the thesis) followed by hands-on exercises and a take-home assignment. For completing the exercises and the assignments, we formed nine design teams with three or four people randomly assigned to each team (see Table 7.2).

The project brief was to design an intervention to nurture the experience of visiting a cemetery or attending a funeral using dilemmas that may be experienced in these situations as a starting point. The choice of the brief was motivated by two factors: to choose a context in which there would be some unexpected dilemmas instead

of obvious ones; and to explore dilemmas that may involve a conflict between moral values instead of conflicts related to emotion regulation (e.g., dilemmas related to dieting, procrastination and so on), since the latter type of dilemmas had previously been explored (see Chapter 5 of this thesis).

The workshops were structured in a way that the teams could follow the three main activities of designing with dilemmas (discovery, definition, application) across three weeks. One week prior to the workshops, the teams were introduced to the project brief. In the first workshop, the methods for identifying dilemmas were explained, and each team was assigned a method for identifying dilemmas.[1] To gain hands-on experience with these methods, the teams worked on a simple design brief, (i.e., enhance the experience of drinking coffee from the vending machine) in the rest of the first workshop. As a take-home assignment, all teams were asked to identify three to five dilemmas using the method assigned to their group, and to fill in the framework of dilemmas (see Figure 7.5) for each dilemma they identified as input for the second workshop. The teams that would conduct an interview or use the ECC procedure were asked to recruit a research participant from their social circle to complete this assignment.

The second workshop consisted of two parts. In the first part, all design teams worked together to rate the design value of the dilemmas identified by other teams. For this, we asked the participants to place a sticker on three dilemmas (identified by other teams) that they thought was relevant and inspiring to design with. Next, each design team counted the stickers (i.e., votes) that the dilemmas they identified received and selected the dilemma that received the most stickers as the "design-worthy dilemma" to use in ideation. In the second part, the design teams received a short lecture on formulating abstract and concrete representations of dilemmas and the three design directions that can be used to address dilemmas (see Table 7.1). To support ideation, we provided each team with a collage of existing design examples that align with each direction (see Figure 2.4, Chapter 2 of this thesis). The teams created ideas following three-steps:

1 Due to the collaborative nature of the co-exploration procedure, it was assigned to the teams with four members. In addition, three groups were assigned to conduct an in-depth interview and three groups to follow the ECC procedure.

(1) individually creating ideas using each direction, (2) discussing the ideas created in the first step as a team, and (3) improving some ideas or creating new ideas as a team.

In the third and final workshop, each team presented three of their ideas, one for each design direction, which they thought best represented their design approach. We allowed time for questions and discussion following each presentation. Finally, all students filled in a survey about the process of designing with dilemmas, which was followed by a plenary discussion on the topic. The survey consisted of the following open-ended questions:

1. What was the most interesting part of designing with dilemmas?
2. What, in your opinion, is the most significant benefit of designing with dilemmas – for example, for the user and/or for the designer?
3. What did you find challenging/irrelevant about designing with dilemmas?

Analysis

Out of thirty participants, 27 responded to the survey. Two responses were excluded because of vague or incomplete answers to the questions. The remaining 25 responses were gathered in one text-document. The responses to each question (i.e., the most "interesting", the most "significant", and the most "challenging" aspects of designing with dilemmas) were first categorized according to the design activity they related to (i.e., identifying dilemmas (discovery), selecting a target dilemma (definition), generating ideas (application)). Next, the remarks about the interesting or significant aspects of designing with dilemmas were contrasted with remarks about the challenging aspects for each activity to reveal the opportunities and challenges of designing with dilemmas. We complemented the data with notes taken during in-class discussions and the insights from the evaluation of final design ideas by the course instructors. Our analysis yielded five challenges of designing with dilemmas, which are explained in the following section.

Findings

Table 7.2 provides the number of ideas generated by each group, the method they used to identify dilemmas, the frequency with which they used each design direction, and the total number of ideas created. Although the numbers do not differ greatly, students created the highest number of ideas for 'resolving dilemmas', and the least number of ideas for 'triggering dilemmas'.

Table 7.2. Overview of the output from the design workshops

Groups & number	DISCOVERY	DEFINITION	APPLICATION			
	Identification method	No. of votes for the selected dilemma	No. of ideas generated			
			Resolving dilemmas	Moderating dilemmas	Triggering dilemmas	Total
1 (4 people)	Co-exploration	16	10	13	10	33
2 (4 people)	Co-exploration	11	10	7	6	23
3 (4 people)	Co-exploration	16	13	5	5	23
4 (3 people)	Interview	18	7	7	6	20
5 (3 people)	Interview	18	5	6	7	18
6 (3 people)	Interview	21	2	3	2	7
7 (3 people)	ECC	19	3	8	2	13
8 (3 people)	ECC	18	3	4	1	8
9 (3 people)	ECC	23	7	5	5	17
TOTAL			60	58	44	162

We structured the rest of the findings according to the challenges experienced when designing with dilemmas. In the following sections, we explain each challenge with direct participant quotes denoted by [P].

Identifying dilemmas (discovery): Challenge 1 - dilemma first or ingredients first?

Eleven out of twenty-five participants recognized the value of dilemmas as input for user-centered design activities and appreciated learning about various ingredients of dilemmas (mutually exclusive choices, mixed emotions, and conflicting concerns). However, the participants noted that a thorough understanding of these ingredients is essential for identifying dilemmas. This was particularly the case

for groups who were assigned interviewing as a research method to identify dilemmas. These groups noted that it was important to "keep looking for dilemmas in the conversation". The comments of the participants can be summarized as follows:

> *It is very easy to relate to users' dilemmas, because everybody experiences them [P5, P15]. With this approach, you know that your solutions will be relevant for people [P9, P13, P14, P15, P16, P21, P22, P24]. Dilemmas offer the designer a way of understanding the complex emotional aspects of a design brief [P6, P9, P16]. It is interesting to design with the confrontation of the characteristics of a dilemma, because it helps to find the motivation behind choices, and thus, to better understand user behavior and to design for deeper concerns [P2, P19, P24]. However, it was hard to distinguish among different dilemmas at the beginning, because they all seem to relate to each other [P10, P16].*

Reformulating concern statements (definition): Challenge 2 - inspiration vs. information

This challenge is related to the *formulation criterion* on the qualities of design-worthy dilemmas: A design-worthy dilemma is abstract enough to be inspiring, but also concrete enough to give direction or contextual information (see Chapter 4 of this thesis). In line with this, five participants emphasized the need to balance abstract and concrete formulations when designing, and created various combinations of concerns by using both. In this way, they were able to transform dilemmas that were initially only about concrete choices to abstract dilemmas that could inspire a wide range of ideas. However, when communicating the dilemmas they used to other design teams, three participants noted that formulations that were inspiring in ideation were not clear enough for others to understand. The following paragraph outlines the responses on this challenge:

> *It is interesting to find inspiring combinations of concerns by going from a concrete concern to an abstract concern and to use the abstraction level to design things that are not similar with the initial level anymore [P12, P22]. This exercise makes you think about solutions in a totally different way, and it also opens your eyes to near solution spaces [P1, P11, P17]. However, formulating a dilemma at an inspiring level, that is also clear enough for others to understand, is difficult – especially when formulating concern statements and the choices [P2, P3, P22].*

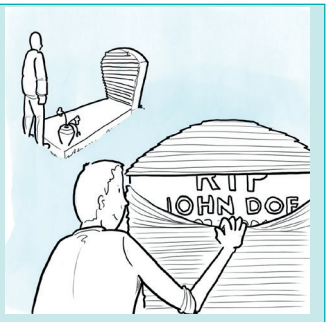
We will refer to several design ideas created during the second workshop when explaining the challenges described in the following paragraphs. Figure 7.6 outlines these design ideas with the dilemma they intend to address and a brief explanation.

DILEMMA
I want to spend the last days of my loved one with her, doing enjoyable things
I want to talk about her funeral so that I can plan it according to her wishes

AEVUM BOOKLET
(resolves the dilemma)
A small album that suggests activities to do together with the person who is terminally ill. As last memories are collected, the booklet can also be a conversation starter for planning the funeral.

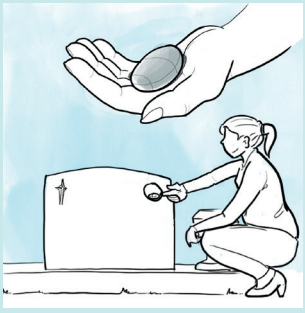
DILEMMA
I want to keep remembering my loved one
I want to move on with my life

REMEMBER! BRACELET
(resolves the dilemma)
A bracelet that, at random moments, releases the smell of the perfume the deceased person used. This way, one does not need to be afraid of forgetting him and can open herself to meeting new people.



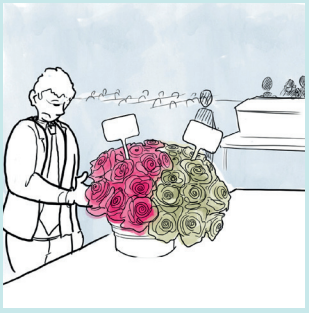
DILEMMA
I want to behave respectfully in a cemetery
I want to read what's written on different gravestones

SNEAKPEEK STONE
(moderates the dilemma)
A gravestone that has a curtain to cover the information on the stone. If someone is curious about the text, he has to remove the curtain, which strengthens guilt feelings for disrespecting the details of the deceased.



DILEMMA
I want to move on with my life (e.g., go on a long vacation)
I want to stay close to my loved one (e.g., visit his grave everyday)

BRINGwithME STONE
(moderates the dilemma)
A gravestone that can be detached from the original grave to be kept as a symbol of remembrance for the grieving person.



DILEMMA
I want to show my support at a funeral
I want to grieve about my loss at a funeral

SUPPORT FLOWER
(triggers the dilemma)
Two different types of flowers that can be offered at a funeral to trigger thoughts about one's role in a funeral: Am I here to support others or do I want to take this time to process my loss?

DILEMMA
I want to spend the last days of my loved one with her, doing enjoyable things
I want to talk about her funeral so that I can plan it according to her wishes

MEMENTO BRACELET
(triggers the dilemma)
A bracelet that lets the user feel the heartbeat of his loved one, which reminds him that he has limited time to prepare for his loss.

Figure 7.6. Six example design ideas created during the second workshop [i]

Choosing a design direction (application): Challenge 3 - resolving, moderating, or triggering?

Eleven participants found it inspiring to work with the three design directions, which led to a large variety of design ideas. For instance, the team who designed the Aevum Booklet (Figure 7.6) talked about two different versions of the same booklet, one for resolving the dilemma and one for moderating it. For resolving the dilemma, the booklet suggests enjoyable activities that can be a conversation starter for planning the funeral. For moderating the dilemma, the team prioritized the concern for "having fun together", and redesigned the booklet by focusing on activities that are generally enjoyable.
By evaluating the same product from the lens of two different design directions, the participants were able to arrive at ideas that they would not otherwise consider.

However, three participants expressed that it was a challenge to address a selected dilemma through all three design directions. For example, to resolve the dilemma, *I want to arrange an affordable funeral (e.g., buy a coffin made of cardboard) vs. I want to arrange a sophisticated funeral (e.g., buy a coffin made of oak),* the design team created affordable and sophisticated products, such as a cardboard coffin with embedded flower seeds. The team thought it was insensible to moderate or trigger this dilemma. Specifically for the latter case, they noted, *"triggering people to think about 'whether they want an expensive coffin or a cheap one for someone they love' just does not sound right."* In addition, three participants observed that their ideas could be categorized under more than one direction. For instance, Remember! Bracelet (Figure 7.6) intends to resolve the dilemma of remembering the deceased vs. moving on with one's life; however, following a discussion, the team also acknowledged that being exposed to the perfume of someone one has lost can worsen feelings of sadness and grief. On these challenges, the participants mentioned the following:

> *It is interesting to realize that design is not always about solving problems [P4, P6, P10, P23, P24], and to learn that there are multiple ways of tackling a dilemma [P3, P6, P14, P17, P20, p21]. The three different directions did lead to three totally different concepts! [P23] This generates new opportunities to design for [P13, P20]. However, it was sometimes difficult to come up with ideas for all design directions [P9, P13, P24]. Another issue was that I could not always distinguish which direction an idea followed – if you thought about an idea in a different way, it could fit under another design direction [P22, P23, P24].*

Generating ideas (application): Challenge 4 - novelty vs. feasibility

Although majority of the participants commented that designing with dilemmas can help creating novel design ideas; seven participants pointed out that this approach was not as useful for supporting design activities following ideation. One of the design ideas that demonstrates this challenge is the SneakPeek Stone (Figure 7.6): The design team acknowledged that this design idea is a good illustrative example of moderating dilemmas (i.e., creating barriers to one of the concerns); however, they also noted that they could not envision how this idea would work in real life.

> *After the first phase of designing, I don't think dilemmas will be a great tool to design with since the outcome is too abstract [P6, P7, P8]. It seems to yield gimmicky or funny product ideas, which explain themselves, but they are not always relevant for real life [P1, P14, P15, P19]. For example, it is easy to come up with something like a tell-sell product for resolving dilemmas [P7].*

Generating ideas (application): Challenge 5 - autonomy vs. responsibility

It seemed important for participants to express their values as a designer; however, they feared that these values could conflict with the values of their users. Four participants emphasized this being a challenge when using the design direction, *moderating dilemmas* (prioritizing the fulfillment of one concern over the other). Within the context of visiting a cemetery or attending a funeral, explicitly choosing to fulfill one concern or consciously blocking the fulfillment of the other led the designers to scrutinize the appropriateness of their intentions, because they feared that the resulting ideas could be experienced as offensive or annoying. An example is the BringWithMe Stone (Figure 7.6). The participants mentioned that carrying a piece of gravestone could be a source of relief (i.e., I did not abandon the memory of my loved one) when, for example going on holiday when trying to move on with life. However, being such a strong symbol of remembrance, it could also cause emotional fixation on one's loss.

> *Designing with dilemmas makes you, as a designer, reflect on what you take into account and what you exclude when you are addressing a dilemma [P1, P3]. It is interesting to have two different concerns instead of one, and deciding: do I want one or both? Here, you have to take multiple perspectives into account, think about your design, and its impact from a lot of other directions [P15, P25]. Some dilemmas create provocative*

ideas [P18, P21]. I do not want to offend or annoy people by designing a "preacher" product that tells them what to do [P4, P15].

The participants expressed ethical concerns also when designing to trigger dilemmas. For instance, although the majority of participants thought that Memento bracelet (Figure 7.6) was a striking idea, they also commented that hardly anyone would want to own such a product because it was too confrontational. Similarly, for the Support Flower (Figure 7.6), participants mentioned that having to choose either a supportive role or grieving role at the beginning of a funeral would not only trigger a dilemma between these choices, but also annoy the users because they would feel forced to choose roles that they may not agree with in the first place. As a result of this discussion, some participants suggested that having a third group of flowers that does not convey a role in the funeral could make the idea less annoying, while still triggering the intended dilemma.

Discussion

Our findings revealed five main challenges experienced when designing with dilemmas. In this section, we reflect on these challenges and provide recommendations for dealing with them.

Challenge 1 - dilemma first or ingredients first?

This challenge was related to the order of activities *identifying dilemmas* and *analyzing dilemmas.* Typically, dilemmas are first identified using a specific research method, and next, the research data is analyzed to reveal the ingredients of dilemmas. However, without a thorough understanding of the dilemma ingredients, it may be challenging for the investigator to ensure that all ingredients are captured during user research. Having been developed specifically to identify dilemmas, ECC and co-exploration are characterized by procedures that guide identification of these ingredients during research. However, when using a more established method such as interviewing, the investigator may first need to get familiar with the dilemma phenomenon, and prepare interview questions which can guide identification of dilemma ingredients. Here, the preparation of experience booklets, and possibly their analysis prior to the interview, play an important role in the success of the interviews. Due to limited time, the workshop participants did not use experience booklets in preparation for the interviews they conducted in the first week, which may have contributed to this challenge.

Recommendation: Where possible, research procedures developed specifically to identify dilemmas may be preferred when identifying dilemmas. Examples are ECC procedure and co-exploration. When using phenomenological interviewing (or in-depth interviewing in general), preparing experience booklets that probe for choices, emotions, and concerns involved in dilemmas may help focusing user research on this phenomenon.

Challenge 2 - inspiration vs. information

This challenge indicates that the formulation of dilemmas as input for ideation may not be the ideal formulation for communication of dilemmas within or across design teams. This project was carried out by a small team of designers each of whom took part in all activities. In such a scenario, the designer has a good understanding of all the necessary background information to effectively communicate a dilemma to others outside of the team, even if the conflicting concern statements are too abstract or vague. Although the framework of dilemmas (Figure 7.5) can serve a communication function, two participants suggested that understanding and using this tool has a learning curve, and thus, it may not work well as a communication tool. Moreover, in practice, design projects may be divided among various teams with different expertise or some activities may be outsourced (e.g., user research). As a result, these challenges necessitate developing effective ways to clearly communicate identified and selected dilemmas within and across teams.

Recommendation: Developing new means of communicating dilemmas, such as a short narrative or an illustration, that address all ingredients included on the framework of dilemmas may help to better communicate dilemmas within or across teams. More importantly, studying team communication when designing with dilemmas is an area for future research. In light of such research, communication of dilemmas may itself be a design activity that bridges dilemma selection and ideation.

Challenge 3 - resolving, moderating, or triggering?

The main goal of the design directions was to offer new ways of thinking that may otherwise not be considered in ideation, and specifically to emphasize that designers can respond to dilemmas in multiple ways that go beyond resolving them (Ozkaramanli, Desmet, & Özcan, 2016; Chapter 2 of this thesis). As nearly half of the participants recognized this opportunity in their responses to the survey, our findings show that this goal was fulfilled. However, when design

directions are offered as discrete categories (i.e., resolving, moderating, triggering), the expectation tends to be that there is no overlap among these categories. In fact, there is considerable overlap among the design directions, and this is desirable: discussing the similarities of these directions as well as their differences can improve their understanding and use. In addition, some design directions may seem more appropriate for addressing certain types of dilemmas. Although attempting to address a dilemma using all three design directions may not always lead to favorable design ideas, the attempt itself does enhance understanding of the dilemma itself. This can be compared to the co-evolution model of the problem and solution in the design process (see Dorst & Cross, 2001).

Recommendation: It should be clearly communicated that the proposed directions do not represent distinct categories and that overlaps are possible and desirable. In addition, designers may be encouraged to explore all directions when responding to a dilemma to extend understanding of the dilemma being addressed.

Challenge 4 - novelty vs. feasibility

"Creative design is not necessarily good design" (Dorst & Cross, 2001; p. 431). Although the ideas generated in the workshops were illustrative examples of the design directions, not all of them were realistic or feasible. We argue that the underlying challenge here is suspending the judgment about initial design ideas (Hernandez, Shah, & Smith, 2010). In an effort to implement the design directions, an initial idea may seem like a direct translation of the intention to an idea, and thus, lack the subtlety often observed in good design. For instance, Sneak-Peek Stone (Figure 7.6) clearly illustrates the moderating intention; however, it was considered a "funny" idea that could "never" (in participants words) be implemented. Although this may indeed be the case, we suggest that such design ideas may either become realizable through refinement, or they may inspire other ideas that are more subtle and realizable.

Recommendation: It should be emphasized that designing with dilemmas involves conceptual design activities, and that it leads to ideas that are often starting points for further ideation and refinement, rather than to ideas that are portfolio-ready.

Challenge 5 - autonomy vs. responsibility

Although this challenge is applicable to any design activity, it became more obvious when implementing the design directions in the context of the given design brief. Our observation was that the majority of the participants found it difficult to design for a ritual with so much social, cultural and personal significance. On this, three participants explicitly mentioned, "I would rather not deal with funerals". This may have influenced some participants' motivation to fully engage with the design brief. Interestingly though, we observed that it triggered a sense of responsibility and yielded very rich discussions in the workshops, which we did not experience in previous projects when the selected design domain was, for example, dieting or procrastination. It might be that the "heavier" the topic, the richer the speculation on the emotional impact of design ideas. Lloyd and Poel (2008) stated that a way of teaching ethics in the context of studio-based design education might be to use games to enable design students to "feel" the responsibility instead of merely acquiring theory-based knowledge through lecturing. In line with this, dealing with dilemmas, and particularly moral dilemmas, may be another way to support designers in "feeling" the responsibility of their design decisions.

Recommendation: To support designers in taking the ethical implications of their design decisions into account, the designer's dilemma between autonomy and responsibility may provide a fruitful lens to explicitly discuss the role designers assume in society. Although this may work for any type of user dilemma, the "felt" responsibility seems to be amplified in cases that involve users' moral dilemmas.

General discussion

The main aim of this chapter was two-fold: The first aim was to organize the knowledge on dilemma-driven design in a way that dilemmas can be integrated in the design process. And the second aim was to outline the opportunities and challenges of this approach. Conflict-driven thinking has become a topic of interest in user-centered design. Several design methods incorporate conflicting entities in their rationale; however, few make use of conflict as a concept that can drive the design process. Dilemma-driven design approach involves activities directly aimed at using intrapersonal concern conflicts, or dilemmas, as input for the user-centered design process.

The first section of this chapter provided an overview of design aids that can support the three main activities carried out when designing with dilemmas. Such an overview can support designers in understanding the range of possibilities for accomplishing a certain task (e.g., identifying dilemmas, generating ideas). This is similar to choosing a meal when having dinner at a restaurant: one may find it challenging to decide what to eat without knowing what is being offered, i.e., taking a look at the menu. In the context of designing with dilemmas, such plurality proved to be particularly beneficial in ideation. Participants found it inspiring to discover new ways of addressing dilemmas that went beyond resolving them. However, the plurality of design aids may also be a challenge, particularly when identifying dilemmas, where it is possible to employ various research methods. As each method comes with potential benefits and limitations, investigating the relationship between the choice of method for identifying dilemmas and its potential influence on selection and ideation is a possible area for future research.

In the first section, the activities involved in designing with dilemmas were mapped on to the initial stages of the basic design cycle. This was an obvious choice since any attempt at designing involves going through these basic stages. In addition to the basic design cycle, dilemma-driven design possesses characteristics of other well-known design models. First, similar to TRIZ (Atshuller, 1961, 1984 as cited in Moehrle, 2005), it places the concept of conflict at its core and organizes the knowledge and supporting tools around this central concept. Second, several design decisions in dilemma-driven design are made in an iterative way characterized by the co-evolution of the problem and the solution (see Dorst & Cross, 2001). For instance, creating ideas using each design direction may help better understand the dilemma, or creating preliminary ideas when selecting a design-worthy dilemma may help understanding the qualities of design-worthy dilemmas. Third, choosing among design directions that lead to ideas with distinct emotional impact is an opportunity for expressing a stance through design. This opportunity, however, also emphasizes the need to assume responsibility for this expression. The concepts of freedom and responsibility are also among the pillars of ViP method (see Hekkert & van Dijk, 2011).

Limitations and future research

These results are a first step towards improving dilemma-driven design as a design approach. One of the limitations is that the focus in this chapter was on the behavior of an individual designer rather than a design team. However, methods and tools are often used in design teams where interacting within or across teams is the biggest source of uncertainty in the design process (Daalhuizen, Badke-Schaub, & Batill, 2009). Therefore, the challenges of using dilemmas in a design team should further be investigated in future research. A potential challenge here may be that "dilemmas get lost in translation" across teams, which can jeopardize their creative potential.

Further studies are necessary to evaluate and extend the preliminary findings on the opportunities and challenges of designing with dilemmas, particularly by expert designers working in design practice. We predict that expert designers would adopt this approach differently than novice designers do. For instance, we predict that the qualities of design-worthy dilemmas can be extended through case studies conducted in design practice. Moreover, while novice designers tend to "follow" the activities involved in designing with dilemmas, we expect that expert designers would challenge, skip, and modify them in a way that is meaningful and productive for their practice (Jensen & Andreasen, 2010). In short, studying the adoption of dilemma-driven design in industry projects could help understanding the aspects that makes this approach relevant for design practice.

The development and evaluation of some of the tools discussed in this chapter are also among important areas for future research. Particularly, improving the co-exploration procedure using a research-through-design approach is in our agenda for future research. In addition, the key qualities of design-worthy dilemmas can be transformed into a tangible and engaging design tool to support its adoption and implementation in design activities.

References

Andreasen, M. M. (2003). Improving design methods' usability by a mindset approach. In Udo Lindeman (Ed.), *Human Behavior in Design* (pp. 209–218). Springer Berlin Heidelberg.

Bem, D. J. (1967). Self-perception: An alternative interpretation of cognitive dissonance phenomena. *Psychological Review, 74*(3), 183–200.

Benack, S., Basseches, M., & Swan, T. (1989). Dialectical thinking and adult creativity. In J. A. Glover, R. R. Ronning, and C. R. Reynolds (Eds.), *Handbook of Creativity* (pp. 199-208). New York, USA: Springer US.

Bins, W. (2014). *Better Safe than Sorry! A Design Intervention that Triggers People to Reflect on Continuous Spatial Changes with an Emphasis on Local Wind-Farm Implementation.* Master thesis. Delft University of Technology, Delft, The Netherlands.

Coehoorn, M. (2014). *Phubbing? An Absurd Design Intervention for Redefining Smart-Phone Usage.* Master thesis. Delft University of Technology, Delft, The Netherlands.

Cross, N. (2003). The expertise of exceptional designers. In N. Cross and E. Edmonds (Eds.), *Expertise in Design, Creativity and Cognition Press,* (pp. 23–35), Sydney, Australia: Sydney University of Technology.

Daalhuizen, J. (2014). *Method Usage in Design: How Methods Function as Mental Tools for Designers.* Unpublished doctoral dissertation. Delft, The Netherlands: Delft University of Technology.

Daalhuizen, J., Badke-Schaub, P., & Batill, S. M. (2009). Dealing with uncertainty in design practice: issues for designer-centered methodology. In M. Norell Bergendahl, M. Grimheden, L. Leifer, P. Skogstad, U. Lindemann (Eds.), DS 58-9: Proceedings of ICED 09, *the 17th International Conference on Engineering Design,* Vol. 9, Human Behavior in Design. California, 24-27 August.

Dorst, K., & Cross, N. (2001). Creativity in the design process: Co-evolution of problem–solution. *Design studies, 22*(5), 425–437.

Emmons, R. A., & King, L. A. (1988). Conflicts among personal strivings: Immediate and long-term implications for psychological and physical well-being. *Journal of Personality and Social Psychology, 54*(6), 1040–1048.

Englander, M. (2012). The Interview: Data Collection in Descriptive Phenomenological Human Scientific Research. *Journal of Phenomenological Psychology, 43*(1), 13–35.

Festinger, L. (1957). *A theory of Cognitive Dissonance.* Stanford, CA: Stanford University Press.

Fokkinga, S., & Desmet, P. M. A. (2012). Meaningful mix or tricky conflict: A categorization of mixed emotions and their usefulness for design. In J. Brassett, P. Hekkert, G. Ludden, M. Malpass and J. McDonnell (Eds.), *Proceedings of the 8th International Conference on Design and Emotion,* London, 11-14 September.

Ford, M. E. (1992). *Motivating Humans: Goals, Emotions, and Personal Agency Beliefs.* California, USA: Sage Publications.

Frijda, N. H. (2010). Not passion's slave. *Emotion Review, 2*(1), 68–75.

Gaver, B., Dunne, T., & Pacenti, E. (1999). Design: Cultural probes. *Interactions, 6*(1), 21–29.

Hekkert, P., & van Dijk, M. (2011). *ViP-Vision in Design: A Guidebook for Innovators.* Amsterdam, The Netherlands: BIS Publishers.

Hernandez, N. V., Shah, J. J., & Smith, S. M. (2010). Understanding design ideation mechanisms through multilevel aligned empirical studies. *Design Studies, 31*(4), 382–410.

Innemee, J. (2014). *Uniekies Game: Changing a Child's Mindset towards Children with Disabilities.* Master thesis. Delft University of Technology, Delft, The Netherlands.

Jensen, T. E., & Andreasen, M. M. (2010). Design methods in practice: Beyond the systematic approach of Pahl and Beitz. In D. Marjanovic, M. Storga, N. Pavkovic, and N. Bojcetic (Eds.), *Proceedings of DESIGN 2010, the 11th International Design Conference,* Dubrovnik, Croatia, 16-19 May.

Kleiman, T., & Hassin, R. R. (2011). Non-conscious goal conflicts. *Journal of Experimental Social Psychology, 47*(3), 521–532.

Lloyd, P., & Van De Poel, I. (2008). Designing games to teach ethics. *Science and Engineering Ethics, 14*(3), 433–447.

Mann, D. (2001). TRIZ: The Theory of Inventive Problem Solving. *Creativity and Innovation Management, 10*(2), 123–125.

Moehrle, M. G. (2005). What is TRIZ? From conceptual basics to a framework for research. *Creativity and innovation management, 14*(1), 3–13.

Moustakas, C. (1994). *Phenomenological Research Methods.* Thousand Oaks, CA, USA: Sage Publications.

Ozkaramanli, D., Desmet, P. M. A., & Özcan, E. (2016). Beyond resolving dilemmas: Three design directions for addressing intrapersonal concern conflicts. *Design Issues, 32*(3), 78–91.

Ozkaramanli D., Özcan E., & Desmet P. M. A. (2014). Capturing conflict experiences: Five methods for identifying intra-personal concern conflicts. In J. Salamanca, P. M. A. Desmet, A. Burbano, G. Ludden and J. Maya (Eds.), *The Colors of Care: Proceedings of the 9th International Conference on Design and Emotion,* Bogotá, Colombia, 6-10 October. Bogotá: Ediciones Uniandes.

Ozkaramanli D., Fokkinga S. F., Desmet P. M. A., Balkan E., & George E. (2013). Recreating AlaTurca: Consumer goal conflicts as a creative driver for innovation. In D.S. Fellows (Ed.), *Brilliant Transformations: Proceedings of Qualitative Research 2013,* Valencia, 17-19 November. Amsterdam: ESOMAR.

Roozenburg, N. F., & Eekels, J. (1995). *Product Design: Fundamentals and Methods (Vol. 2).* Chichester, UK: Wiley.

Schwartz, B. (2004). *Paradox of Choice: Why More is Less.* New York, NY: HarperCollins Publishers.

Sleeswijk-Visser, F., Stappers, P. J., van der Lugt, R., & Sanders, E. B. N. (2005). Contextmapping: Experiences from practice. *CoDesign, 1*(2), 119–149.

Tromp, N. (2013). *Social Design.* Unpublished doctoral dissertation. Delft University of Technology, Delft, The Netherlands.

Wilson, T. D. (2002). *Strangers to Ourselves: Discovering the Adaptive Unconscious.* Cambridge, MA: Harvard University Press.

i The ideas shown in Figure 7.6 are created by the design students of Delft University of Technology as part of the Design for Emotion Elective Course, 2015: Aevum Booklet and Memento Bracelet by Pauline Fles, Nina Patsey, and Bas ter Haar Romenij; Remember Bracelet by Rick Boellaard, Minsung Kim, and Jasmijn Kok; SneakPeek Stone by Arjana van Berkel, Leonie Houwen, and Hala Talib; BringWithMe Stone by Rozemarijn Klein Heerenbrink, Sofia Hnatiuk, Bob van Iersel, and Jaap Meijer; Support Flower by Eva Aussems, Beatrice Chichiarelli, and Samuel Verburg. Illustrations by Freya Ruijs.

CHAPTER 8

Conclusions

The goal of this thesis was to (a) increase our understanding of how personal dilemmas can inform user-centered design, and to (b) develop design aids that support designers in integrating user's dilemmas in their design processes. This overall aim translated to three sub-aims and the following research questions (RQs):

Sub-aim 1 Understanding the role of design in addressing personal dilemmas:

- (RQ1) What categories exist within the domain of dilemma-addressing product design?

Sub-aim 2 Supporting designers in identifying relevant and inspiring personal dilemmas:

- (RQ2) What are suitable criteria for selecting relevant and inspiring (i.e., design-worthy) dilemmas?
- (RQ3) What are suitable criteria for framing concerns in a dilemma?

Sub-aim 3 Supporting designers in creating designs to address personal dilemmas in three distinct design directions, namely resolving, moderating, and triggering dilemmas:

- (RQ4) What design strategies can facilitate ideation when resolving dilemmas?
- (RQ5) What design strategies can facilitate ideation when addressing self-control dilemmas?
- (RQ6) What design strategies can facilitate ideation when triggering dilemmas?
- (RQ7) What are the opportunities and challenges involved in designing with dilemmas?

In this final chapter, the main findings of this thesis are highlighted with respect to each sub-aim, the main conclusions and limitations of this research are outlined, and implications for theory, as well as design students, professionals, and users are drawn. Table 8.1 summarizes the main insights derived from each chapter, and the implications of the findings for design.

Table 8.1. Overview of the main insights and design implications of each chapter

Chapter	Research question(s)	Main insight	Implication for design
2	RQ1	There are at least three ways with which design can address dilemmas.	Plurality of design directions supports the creation of new design ideas that might otherwise not be considered in ideation.
2	RQ2	Dilemmas that are worth designing for possess seven distinct qualities.	Examining the qualities of design-worthy dilemmas can support framing an appropriate solution space.
4	RQ3 RQ4	Dilemmas can be formulated at differing abstraction levels, and resolved using at least four design strategies.	Consciously examining alternative dilemma formulations supports the creation of problem definitions that might otherwise not be considered.
5	RQ5	Self-control dilemmas can be framed as conflicts between long-term goals and temptations, and moderated using three design strategies that prioritize the fulfillment of long-term goals.	Framing problematic user behaviors as self-control dilemmas helps discovering the complexity of designing for behavior change.
6	RQ6	Triggering dilemmas is a counterintuitive design direction for creative problem solvers, requiring distinct design strategies in ideation.	Triggering dilemmas can be a means to design for provocation.
7	RQ7	Designing with dilemmas poses both opportunities and challenges in the design process.	Being aware of the opportunities and challenges of designing with dilemmas can help appropriating the approach when addressing a given design brief.

Sub-aim 1. Understanding the role of design in addressing personal dilemmas:

Design can have three distinct roles when addressing dilemmas: when **resolving dilemmas**, it eliminates the need to make a choice; when **moderating dilemmas**, it facilitates making a choice by prioritizing one alternative over the other, and when **triggering dilemmas**, it exposes the conflict underlying the dilemma. These three directions can further be interpreted as products having a harmonizing effect, a motivating effect, and a reflective effect on users, respectively. Resolving dilemmas might have a harmonizing effect by simultaneously fulfilling conflicting concerns. In addition, designers can motivate people to act in ways that align with their long-term goals (or personal values) through prioritizing the fulfillment of these goals over immediate desires. Finally, designers can stimulate people to reflect on the concerns aroused by a dilemma through triggering dilemmas.

Sub-aim 2. Supporting designers in identifying relevant and inspiring personal dilemmas:

Identifying relevant and inspiring dilemmas can be considered as an act of problem framing. **The qualities of design-worthy dilemmas** (see Chapter 3) explicate designers' main considerations when selecting a target dilemma, which were categorized under three themes: (1) ***relevance*** - the impact of addressing a dilemma on future users, (2) ***inspiration*** - the selected dilemma's potential to inspire design ideas, and (3) ***meaningful*** formulation - the effort to reformulate dilemmas at varying abstraction levels to form an advantageous design space. These qualities can support designers in asking appropriate questions, and thus, can stimulate reflection and discussion when selecting a target dilemma as input for ideation.

Two additional findings can complement the qualities of design-worthy dilemmas when identifying relevant and inspiring dilemmas. These findings are **three levels of personal dilemmas** that guide creating alternative dilemma formulations using three abstraction levels (see Chapter 4) and that structures the main ingredients of dilemmas (see Chapter 5). The three levels of personal dilemmas elaborate the third theme of the design-worthy dilemma qualities, namely meaningful formulation. This theme suggests that design-worthiness can be enhanced by reformulating a dilemma at various abstraction levels. The three levels of personal dilemmas guide

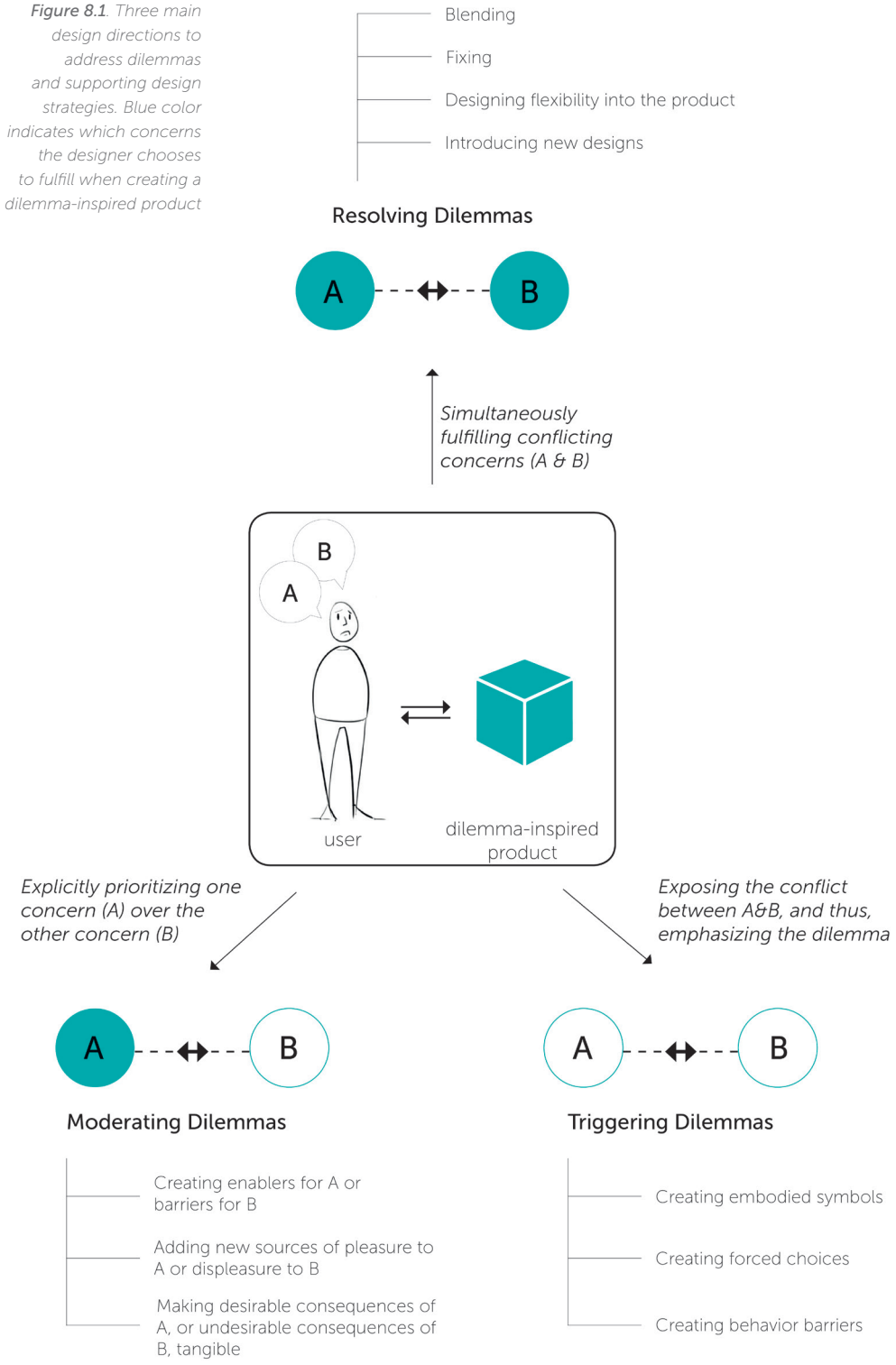
this reformulation process based on emotion-driven design theory (Desmet, 2008) and laddering techniques (Reynolds & Gutman, 1988) (see Chapter 4). Consciously examining alternative dilemma formulations can support defining a design problem that might best inspire design ideation. In addition, the framework of dilemmas provides a compact yet comprehensive overview of the main ingredients of dilemmas, namely mutually exclusive choices, mixed emotions, and conflicting concerns (see Chapter 5). These ingredients can guide the interpretation of self-reports when analyzing dilemmas. Moreover, the framework's graphical representation facilitates thinking about dilemmas at three abstraction levels (i.e., concrete choices, underlying concerns, and abstract motivations), which ties it to the three levels of personal dilemmas. As a result, the iterative implementation of 'qualities of design-worthy dilemmas', 'three levels of personal dilemmas', and 'the framework of dilemmas' can support discovering and defining dilemmas when framing an appropriate problem space.

Sub-aim 3. Supporting designers in creating designs that address personal dilemmas:

For resolving dilemmas, four strategies have been proposed based on analysis of sixty ideas that novice designers created when redesigning a product to resolve a particular dilemma (see Chapter 4). These strategies are **blending** (e.g., collage products), **fixing** (e.g., multi-functional products), **designing flexibility into the product** (e.g., modular or customizable products) and **introducing new designs**. For moderating dilemmas, three design strategies have been proposed based on in-depth interviews with users and prominent self-control theories in psychology literature (e.g., Fishbach & Converse, 2011). These strategies work asymmetrically to either increase the motivational strength of long-term goals (i.e., **creating enablers, adding new sources of pleasure**, and **making desirable consequences tangible**) or to decrease the motivational strength of temptations (i.e., **creating barriers, adding new sources of displeasure**, and **making undesirable consequences tangible**) (see Chapter 5). For triggering dilemmas, three preliminary design strategies have been proposed based on an expert analysis of existing products. These strategies are **embodied symbols, forced choices**, and **behavior barriers** (see Chapter 6). Figure 8.1 outlines the three main design directions that can be used to address dilemmas and design strategies that can support the implementation of each of these directions.

In the studies reported in this thesis, design strategies were observed to differ in reasoning, format, and application technique. For instance, the dilemma-resolving strategies (e.g., blending; fixing) reason from the perspective of product types, and they work well in ideation when redesigning a product. Alternatively, both the dilemma-moderating strategies (e.g., enablers/barriers) and dilemma-triggering strategies (e.g., embodied symbols; forced choices) reason from the perspective of intended user experiences, and they work well in ideation if they are used interchangeably in order to reflect on and to redesign an idea from the perspective of different strategies. Moreover, the findings of this thesis indicate that design strategies are more helpful as check points during ideation, rather than as starting points (see Chapter 6). This might sound counterintuitive considering that the term 'strategy' means having a plan of action (Merriam-Webster dictionary). More often than not, however, the designers who participated in our studies used the strategies to categorize their design ideas after they had created them. In this way, they could think about whether they had achieved enough variety in their ideas (vs. whether they created ideas that align with only one of the strategies), or whether they could modify or develop certain ideas through the lens of different strategies. This finding is in line with findings of Tromp (2013, p. 112), who emphasized that design strategies better serve as a source of inspiration rather than a "formula that leads to design ideas."

Figure 8.1. Three main design directions to address dilemmas and supporting design strategies. Blue color indicates which concerns the designer chooses to fulfill when creating a dilemma-inspired product



Main conclusions

Proposition 1 | Resolving is not the only way in which design can address dilemmas

Resolving dilemmas may be the most evident design direction for designers who are trained in a creative problem-solving tradition. Design literature supports this intuition. For instance, one of the most well-known engineering design methods, the Theory of Inventive Problem Solving developed by Altshuller (1988), is based on an analysis of a large number of former patents which revealed that creative inventions are based on a set of principles that can be used to resolve technical contradictions. In a similar way that TRIZ enables technical innovations, resolving personal dilemmas might drive user-centered innovation. In line with this, Verganti (2009) suggested that meaningful innovation puts people and society at the center of attention and is inspired by approaches of user-centered design when developing new products and services. This shift from properties of products to psychology of people indicates that resolving dilemmas can support the creation of innovative products and services that are highly relevant for people. Adopting a dilemma-driven design approach can facilitate innovation processes through focusing research efforts on capturing and interpreting personal dilemmas and bridging analysis and synthesis through four ideation strategies that resolve dilemmas (Ozkaramanli et al., 2013, also see Chapter 4).

The potential of addressing dilemmas through design goes beyond resolving them. In this thesis, two other design directions have been studied, which are **to moderate** and **to trigger** dilemmas. Moderating dilemmas can complement wellbeing-driven design approaches, particularly those that are sensitive to personal dilemmas such as positive design (e.g., Desmet & Pohlmeyer, 2013) and social design (e.g., Tromp, 2013). Positive design emphasizes that designing for subjective wellbeing (i.e., happiness) sits at the 'sweet spot' of its three main components, which are designing for personal significance (e.g., designing for long-term goals), designing for pleasure, and designing for virtue. When designing for happiness, it is critical to be wary of potential conflicts that designing for any one of these components might induce on the other (Desmet & Pohlmeyer, 2013). One such potential conflict is the conflict between long-term goals and immediate desires (see Chapter 5). As a result, the main contribution of this thesis to positive design is providing the tools that can support

being mindful of conflicts that might otherwise remain unnoticed or unaddressed when designing for happiness.

In addition, the goal-oriented framework of dilemmas (see Chapter 5) contributes to designing for behavior change. Primarily, the framework can help understanding the complexity of human behavior through reflecting on the affective and motivational underpinnings of a particular behavior. As a result, the choice on which behavior to change through design can be made more purposefully. In addition, by focusing on the subjective experience of dilemmas, this framework surfaces the anticipated gains and losses of changing behavior by using emotions as reference points. This 'lived experience' perspective suggests that people can play an active role in behavior change and adopt design interventions that explicitly aim to support them in doing so (e.g., the alarm clock examples described in Chapter 5). This is in contrast to nudging (Thaler & Sunstein, 2008) and social design (Tromp, 2013), which employ implicit means to change people's behavior.

The third design direction, **triggering dilemmas**, has been studied in the context of designing for provocation. Here, the term 'provocative design' (e.g., critical design, reflective design) has been used as an umbrella term to refer to design approaches in which raising questions is as important as finding solutions. When resolving and moderating dilemmas, designers are concerned with finding a fitting solution to address the dilemma. However, when triggering dilemmas, the attention shifts from finding solutions to the dilemma itself. This direction invites the designer to stay in the problem space, explore the complexity of dilemmas without judgment, and embody this understanding in objects. The findings of this thesis indicate that suspending design decisions that would typically lead to a solution is challenging for designers who are trained in a creative problem solving tradition (also see Sengers & Gaver, 2006). This is particularly noticeable when the design brief involves behaviors that can typically be labeled as 'desirable' or 'undesirable' (e.g., safe sex, social exclusion). Overcoming this 'quick moral judgment' challenge might enable being open to multiple, and even conflicting, interpretations, which can support learning from the complexity of human behavior and handling it in diverse ways (see Sengers & Gaver, 2006).

Proposition 2 | If you know how to look, you can find a dilemma in every design brief

Although this research presented designing with personal dilemmas as an approach mainly focused on wellbeing-oriented design briefs, these dilemmas can be valuable starting points for any design brief. People experience many dilemmas during everyday life, ranging from fundamental dilemmas that might have a direct impact on subjective wellbeing to pragmatic ones that improve product experiences. Therefore, it is possible to frame any design brief using dilemmas, even if the brief does not explicitly focus on dilemmas. In fact, it is a fruitful design exercise to think about a product, as simple as a flowerpot, in terms of the dilemmas it resolves or evokes. For instance, we can argue that a flowerpot enables users to enjoy nature when indoors, and thus, it can resolve the conflict between the concern for comfort and the concern for being in nature. Reformulating the conflict at this level creates design opportunities for other ideas that can address the same dilemma, such as having images of nature indoors or furniture that mimics behaviors in nature. Alternatively, while fulfilling the concern for enjoying nature indoors, a particular flowerpot, such as a plastic one, might harm the concern for having a stylish indoor environment. When the dilemmas evoked by specific products are purposefully identified, these products can be redesigned to resolve these dilemmas in order to create more pleasurable product experiences.

Proposition 3 | A single user dilemma triggers a cascade of design dilemmas

One of the main benefits of designing with dilemmas is handling the dilemmas that the approach itself evokes. In Chapter 7, five challenges designers encountered when designing with dilemmas have been explained. Some of these challenges can be interpreted as *designers' dilemmas* (e.g., autonomy vs. responsibility; novelty vs. feasibility). For instance, when formulating alternative dilemmas using various abstraction levels, designers might want to formulate a concrete dilemma that is easy to communicate to others, and at the same time, they might want to formulate an abstract dilemma that affords novel design ideas. Similarly, designing with dilemmas creates autonomy in designing because it enables designers to express their values, particularly in domains laden with moral dilemmas (e.g., the cemetery/funeral brief in Chapter 7). At the same time, the approach creates a sense of responsibility because designers' values may clash with those of users. These design dilemmas are intentional: the insights and tools proposed in this thesis have the common goal to support

asking appropriate questions when designing with dilemmas. In this way, they facilitate reflection and discussion through evoking design dilemmas.

Proposition 4 | Provocative design is unique in its intentions, not in its methods

Provocative design differs from conventional design approaches in terms of its goals, among which are raising awareness, exposing assumptions, and facilitating debate. Designers can respond to conflicting design problems through similar intentions (i.e., exposing dilemmas, facilitating reflection on intrapersonal conflict). However, literature in provocative design offers little practical support (e.g., tools and methods) on *how* to design provocatively. For instance, Dunne and Raby (2013) characterize critical design as more of an attitude rather than a method (also see Bardzell & Bardzell, 2013). Although designing for provocation does necessitate a distinct attitude (i.e., raising questions instead of finding solutions, see Chapter 6), the literature in provocative design can be enriched through developing tools and methods that can support further development and adoption of the approach.

This thesis proposes that triggering dilemmas can be a means to designing for provocation, and suggests three preliminary design strategies for triggering dilemmas through design. These strategies provided an overview of ways with which design can trigger dilemmas, supported by inspiring design examples. Although the strategies were easily understood, implementing them in a new design brief required an active effort to remain engaged with the dilemma (vs. its resolution) through perspective taking and stalling moral judgment on what the 'better' choice could be. Therefore, intentionally triggering dilemmas through design requires understanding and reasoning with the importance of each choice in a dilemma, and to embody this reasoning (vs. its outcome) in the design ideas created. Here, a constructivist approach to studying dilemmas can support evaluating them through different viewpoints, without labeling any one choice more appropriate than the other. Constructivism is characterized by actively constructing knowledge (vs. discovering an objective reality) through systematic reflection and abstraction (Jonassen, 1991). In the context of designing to trigger dilemmas, adopting a constructivist approach means to study dilemmas as dynamic experiences (vs. innate or stable states) with context-dependent cognitive, affective, and behavioral

components. In line with this, the development of future tools and methods to support designing to trigger dilemmas, or designing provocatively in general, can best be based on a constructivist approach to help embracing the complexity of personal dilemmas and the value of design ideas that can explicate this complexity.

Implications

Implications for theory

Designing with dilemmas is positioned to bridge emotion-driven design with designing for subjective wellbeing. The connection between emotion-driven design and design for subjective wellbeing relies on the central role of concerns in both fields. The appraisal approach to product emotions suggests that a potent way of designing for emotions is to design for concerns (Desmet, 2002). Similarly, concerns (mainly referred to as goals in psychology literature) are the main building blocks of human motivation, and thus, their fulfillment plays an important role in general life satisfaction (e.g., Brunstein, 1993). Through its focus on concern conflicts, which has consequences both for short-term product experiences and long-term wellbeing, this thesis expands the literature on emotion-driven design through introducing the concept of conflicting concerns, and contributes to design for subjective wellbeing through emphasizing the role of concerns as motivational constructs.

The findings of this thesis might inspire psychology research to create a more holistic view on dilemma experiences. Intrapersonal concern conflicts have been a topic of discussion in several areas of psychology, including motivational psychology, personality psychology, developmental psychology, and decision-making theories. Researchers in these fields have focused on distinct constructs related to dilemmas (e.g., goals, emotions, behavioral manifestations), used varying terminology (e.g., interference, contradiction, conflict, ambivalence, dissonance, dualism…etc.), and adopted different research approaches to study dilemmas (e.g., experimental, phenomenological). Despite being multi-layered and rich, psychology literature can be too fragmented to form a solid theoretical basis for the development of design theories. Therefore, the findings of this thesis might inspire multi-disciplinary research within the various areas of psychology, as well as between psychology and design, to form more unified theories on the psychology of dilemmas.

Implications for design professionals and design students

There are three main characteristics that make dilemmas interesting for design practitioners. First, dilemmas are engaging phenomena. Everybody experiences dilemmas in everyday life, and this naturally includes design practitioners (i.e., designers, product developers, design students). Throughout this PhD project, for example, giving a couple of common dilemma examples (e.g., health vs. indulgence, career vs. family) has been sufficient for people to grasp the main idea underlying the phenomenon. In other words, the ability to easily understand and identify with users' dilemmas makes this phenomenon engaging to work with. Second, dilemmas involve conflicting concerns, and such conflicts are triggers for creative thinking (Benack, Basseches, & Swan, 1989). This was evident in several dilemma-themed workshops conducted during this PhD project: once a particular dilemma is selected as design input (e.g., health vs. indulgence), the team would almost immediately start discussing design solutions (e.g., can you think of something that is both healthy and indulgent?). Third, dilemmas enable perspective taking. When gathering and analyzing user data, identifying dilemmas necessitates comparing and contrasting the relationships between different perspectives. This helps evaluating competing alternatives and being mindful about potential compromises that might otherwise remain implicit in the design solution.

This thesis offers insights and guidelines that can facilitate reflective thinking when framing design problems. According to Schön (1991), designing involves reframing a design problem by making moves and reflecting on the consequences (intended and unintended) of these moves before planning the next one. Schön (1991) terms this as "listening to the back talk" of the situation. However, being a new approach, it might be challenging to make the *appropriate moves* when designing with dilemmas. The qualities of design-worthy dilemmas (Chapter 3), three levels of personal dilemmas (Chapter 4), and framework of dilemmas (Chapter 5) respond to this challenge through facilitating creative exploration, team discussion, and design reflection in conceptual design activities.

In addition to theoretical insights, this thesis offers practical tools that can facilitate divergent thinking when generating ideas to address dilemmas. Idea generation is a widely discussed phase in design methodology. Roozenburg & Eekels (1995) characterize it as the least

tangible of all stages in the basic design cycle where creativity plays an important role. One of the most important skills required for creativity in ideation is divergent thinking (Guilford, 1950; as cited in Runco, 2012). Divergent thinking is characterized by fluency (i.e., the number of ideas created), originality (i.e., the newness of the ideas), flexibility (i.e., the variety of conceptual categories used in ideation), and elaboration (i.e., the distance followed when using associative thinking) (Guilford, 1968, as cited in Runco, 2012). The main contribution of the design directions (i.e., resolving-, moderation-, and triggering dilemmas) and the supporting design strategies is that they provide an overview of possibilities in ideation. Having this overview can expand the solution repertoire of designers and stimulate thinking in ways that they are unfamiliar with. This might tap into the four characteristics of divergent thinking, where the most obvious contribution might be to the flexibility of design ideas: exploring the design directions and strategies can support generating ideas that might not otherwise be considered in ideation.

The findings of this thesis also have implications for design students. Before designing with dilemmas was a topic of research, design students could address the dilemmas they encounter in their design projects only intuitively. The findings of this project offer them the means to actively seek dilemmas during (user) research and to use these dilemmas as input for ideation. In addition, Chapter 7 is a valuable "way finding" resource for design students, because it gives an overview of how dilemmas can be integrated into the design process, illustrated through a brief that reveals the opportunities and challenges encountered in dilemma-driven design. Moreover, design students are often at the start of developing the critical attitude that often characterizes expert designers. Such characteristics include thinking in abstract and concrete ways, reframing the design problem through shifting perspectives, and making quick yet effective design decisions. The insights and guidelines reported in this thesis can catalyze the development of these skills, because they necessitate a dialogue with the design task through self-reflection and critique (see Schön, 1991; p. 102).

Implications for product users

The theoretical basis of this thesis (i.e., appraisal theory of emotions, see Desmet, 2002) and evidence in psychology literature led us to argue that dilemma-inspired products have a positive contribution

to user experience and subjective wellbeing. Similar to the way designing with dilemmas helps designers to focus on users' dilemmas, dilemma-inspired products might draw users' attention to their personal dilemmas and support them in productively managing these dilemmas. An intuitive argument here is that such products can cause fixation on personal dilemmas as they draw attention to their abundance and recurrence in everyday life. At the same time, building a repertoire of strategies to deal with recurring dilemmas is considered an ingredient of practical wisdom (Baltes & Smith, 2008). Moreover, conflict among goals, despite producing discomfort, is generally viewed as a constructive phenomenon that can stimulate change and adaptation (e.g., Shantz & Hartup, 1995). Future research can further investigate what users specifically appreciate and savor about their interactions with dilemma-inspired products.

Limitations

Theoretical limitations

Striking a balance between conveying the complexity of dilemmas and reducing this complexity to create practical and engaging design tools and guidelines has been a challenge in this thesis. Integrating dilemmas in the design process requires an understanding of the phenomenon. In this thesis, dilemmas have been framed as *snapshots of experiences* that can be constructively managed through design, where the framework of dilemmas (see Chapter 5) serves as an analytical design tool to support structuring and reflecting on captured dilemmas. However, this framework has a number of limitations that should be considered in future research. First, it is limited to a bi-polar decision-making space at a specific point in time, whereas some of our dilemmas involve more than two (i.e., multiple) choice alternatives, which might unfold over time (see Fishbach & Zhang, 2008). Therefore, the framework can be extended to account for the dynamics of multiple goal pursuit over time. Second, this framework does not account for some of the main drivers of human-decision making. For instance, the framework does not differentiate between intrinsic and extrinsic motivations, approach and avoidance motivations, or other goal dimensions, such as importance, difficulty level, complexity, or level of consciousness (see Austin & Vancouver, 1994). Third, the framework does not account for the influence of personality factors (e.g., mood, personality traits) on the tension between the choice alternatives.

Methodological limitations

Novice designers (i.e., master-level design students or recent graduates) have been recruited as participants in several design workshops aimed at evaluating the dilemma-driven design approach (Chapters 3, 4, and 6). Two limitations must be mentioned here. First, working with novice designers poses limitations when evaluating new design approaches. Novice designers are yet to develop certain expertise such as critical reflection or a repertoire of tactics to handle design problems. Because of this, they may have a less critical attitude towards new tools and methods. As a result, future research with expert designers is needed to evaluate the proposed approach in a more critical fashion. Second, evaluating new design approaches in a workshop setting has limitations related to the set-up of these studies. In these workshops, participants had little time to research and elaborate on the dilemmas that they selected (or were given) as input for ideation. In addition, some participants had no prior knowledge on designing with dilemmas. As a result, the design output that resulted from these workshops was occasionally superficial, exaggerated, or gimmicky, compared to the depth and subtlety that could be achieved through longer-term design cases such as those described in Chapter 3.

Future research opportunities

Expanding dilemma-driven design

Hundreds of dilemmas have been gathered in the studies conducted for this thesis. Reflecting on these dilemmas indicated that they can be categorized using multiple lenses to create a typology of dilemmas. Typologies are widespread in design research as they create the opportunity to learn about a phenomenon through comparing the nuances among its types. Examples include the typology of positive emotions, the typology of negative emotions, and the typology of problems (Desmet, 2012; Fokkinga, 2015; Jonassen, 2000, respectively). A typology of dilemmas can create an overview of intrapersonal conflict types that can support better understanding the richness of this phenomenon. For instance, in Chapter 4, dilemmas that were deeply embedded in personal and cultural values have been analyzed, such as “I want to be open to change” vs. “I want to maintain traditional habits”. Addressing such dilemmas through design seems to be a much less straightforward task than addressing the dilemma “I want to have a small bag” vs. “I want to have a bag with compartments”. The complexity of designing with the former is partly due to the type

of concerns involved. Dilemmas involving moral judgment (i.e., moral or ethical values) or self-control dilemmas (see Chapter 5) seem to have greater personal significance than product-driven dilemmas (see Emmons & King, 1988). To our knowledge, psychology literature is too fragmented to clarify what distinguishes different types of dilemmas (e.g., moral dilemmas, self-control dilemmas). As a result, engaging in multi-disciplinary collaboration for creating a design-relevant typology of dilemmas is an opportunity for future research. Such a typology might explicate the nuances among dilemmas, and as such, expose hidden design opportunities in their richness.

Another area for future research is to empirically compare various methods for identifying design-worthy dilemmas. In the studies discussed in Chapter 3, the choice among these methods was largely based on practical considerations. For instance, the designer who carried out the Uniekies project chose to use the Emotion Capture Card procedure, because she had prior experience with the method. Similarly, the designer who attended the design workshops on triggering dilemmas (Chapter 6) reflected on personal experiences to pinpoint dilemmas due to limited time in the set-up of the ideation sessions. These choices indicate that practical considerations, such as time, resources, and expertise, can inevitably influence the choice among these methods. However, our experience indicated that each of these methods might also have theoretical advantages and disadvantages in their application. Therefore, an opportunity for future research is to investigate when and why one method might be preferred over the other. Here, the qualities of design-worthy dilemmas discussed in Chapter 3 can serve as evaluation criteria to compare various methods.

A new research venue

This thesis strictly focused on intrapersonal concern conflicts. An interesting starting point for future research is to investigate interpersonal concern conflicts. Our everyday interactions, including product interactions, almost always involve other people. These people bring their own concerns to the situation, which can conflict with other users' concerns, leading to difficult confrontations, or worse, built up anger and resentment over unresolved interpersonal conflicts. Organizational psychology literature is a rich source of information on interpersonal conflicts and conflict resolution strategies, which can form the basis for developing methods and tools to address

such conflicts through design (see Barki & Hartwick, 2004). Such a design approach is likely to have implications not only for user-centered design, but also for participatory design approaches in which conflicts among various stakeholders can be identified and handled productively.

References

Altshuller, G. S. (1988). *Creativity as an Exact Science: The Theory of Inventive Problem Solving*. New York: Gordon and Breach.

Austin, J. T., & Vancouver, J. B. (1996). Goal constructs in psychology: Structure, process, and content. *Psychological Bulletin*, 120(3), 338–375.

Baltes, P. B., & Smith, J. (2008). The fascination of wisdom: Its nature, ontogeny, and function. *Perspectives on Psychological Science*, 3(1), 56-64.

Bardzell, J., & Bardzell, S. (2013). What is critical about critical design? In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems: Changing Perspectives*, Paris (pp. 3297–3306). New York: ACM Press.

Barki, H., & Hartwick, J. (2004). Conceptualizing the construct of interpersonal conflict. *International Journal of Conflict Management, 15*(3), 216–244.

Benack, S., Basseches, M., & Swan, T. (1989). Dialectical thinking and adult creativity. In J. A. Glover, R. R. Ronning, and C. R. Reynolds (Eds.), *Handbook of Creativity* (pp. 199-208). New York, USA: Springer US.

Brunstein, J. C. (1993). Personal goals and subjective well-being: A longitudinal study. *Journal of Personality and Social Psychology, 65*(5), 1061–1070.

Desmet, P. M. A. (2002). *Designing Emotions*. Unpublished doctoral dissertation. Delft University of Technology, Delft, The Netherlands.

Desmet, P. M. A. (2008). Product emotion. In H. N. J. Schifferstein & P. Hekkert (Eds.), *Product Experience* (pp. 379-397). Amsterdam, The Netherlands: Elsevier.

Desmet, P. M. A. (2012). Faces of product pleasure: 25 positive emotions in human-product interactions. I*nternational Journal of Design, 6*(2), 1-29.

Desmet, P. M. A., & Pohlmeyer, A. E. (2013). Positive design: An introduction to design for subjective well-being. *International Journal of Design, 7*(3), 5–19.

Dunne, A., & Raby, F. (2013). *Speculative Everything: Design, Fiction, and Social Dreaming.* Cambridge, MA: MIT Press.

Emmons, R. A., & King, L. A. (1988). Conflicts among personal strivings: Immediate and long-term implications for psychological and physical well-being. *Journal of Personality and Social Psychology, 54*(6), 1040–1048.

Fishbach, A., & Converse, B. A. (2011). Identifying and battling temptation. In K. D. Vohs & R. F. Baumeister (Eds.), *Handbook of Self-regulation: Research, Theory, and Applications* (pp. 244–260). New York, USA: The Guilford Press.

Fishbach, A., & Zhang, Y. (2008). Together or apart: when goals and temptations complement versus compete. *Journal of personality and social psychology,* 94(4), 547-559.

Fokkinga, S. F. (2015). *Design-|+ Negative Emotions for Positive Experiences.* Unpublished doctoral dissertation. Delft University of Technology, Delft, The Netherlands.

Freud, S. (1929). *Civilization and its Discontents.* London, UK: Penguin Books.

Jonassen, D. H. (2000). Toward a design theory of problem solving. *Educational Technology Research and Development, 48*(4), 63–85.

Jordan, P. W. (2000). *Designing Pleasurable Products*. Oxon, UK: Taylor & Francis.

Jonassen, D. H. (1991). Objectivism vs. constructivism. *Educational Technology Research and Development, 39*(3), 5-14.

Norman, D. A. (2004). *Emotional Design: Why We Love (or Hate) Everyday Things.* New York, NY: Basic Books.

Ozkaramanli, D., Fokkinga, S. F., Desmet, P. M. A., Balkan, E., & George, E. (2013). Recreating AlaTurca; consumer goal conflicts as a creative driver for innovation. In D.S. Fellows (Ed.), *Brilliant Transformations: Proceedings of Qualitative Research 2013*, Valencia, 17-19 November. Amsterdam (NL): ESOMAR.

Reynolds, T. J., & Gutman, J. (1988). Laddering theory, method, analysis, and interpretation. *Journal of Advertising Research*, 28(1), 11–31.

Roozenburg, N. F., & Eekels, J. (1995). *Product Design: Fundamentals and Methods (Vol. 2)*. Chichester: Wiley.

Runco, M. A., & Acar, S. (2012). Divergent thinking as an indicator of creative potential. *Creativity Research Journal, 24*(1), 1–10.

Schön, D. (1991). *The Reflective Practitioner: How Professionals Think in Action.* Basic Books.

Sengers, P., & Gaver, B. (2006). Staying open to interpretation: engaging multiple meanings in design and evaluation. In *Proceedings of the 6th Conference on Designing Interactive Systems* (pp. 99-108). June 26-28, University Park, PA, USA. ACM.

Shantz, C. U., & Hartup, W. W. (1995). *Conflict in Child and Adolescent Development*. Cambridge University Press.

Strategy. 2016. In Merriam-Webster.com. Retrieved August 18, 2011, from http://www.merriam-webster.com/dictionary/strategy

Thaler, R. H., & Sunstein, C. R. (2008). *Nudge: Improving Decisions about Health, Wealth, and Happiness*. New York: Penguin Books.

Tromp, N. (2013). Social Design. Unpublished doctoral dissertation. Delft University of Technology, Delft, The Netherlands.

Verganti, R. (2009). *Design Driven Innovation: Changing the Rules of Competition by Radically Innovating What Things Mean*. Harvard Business Press.

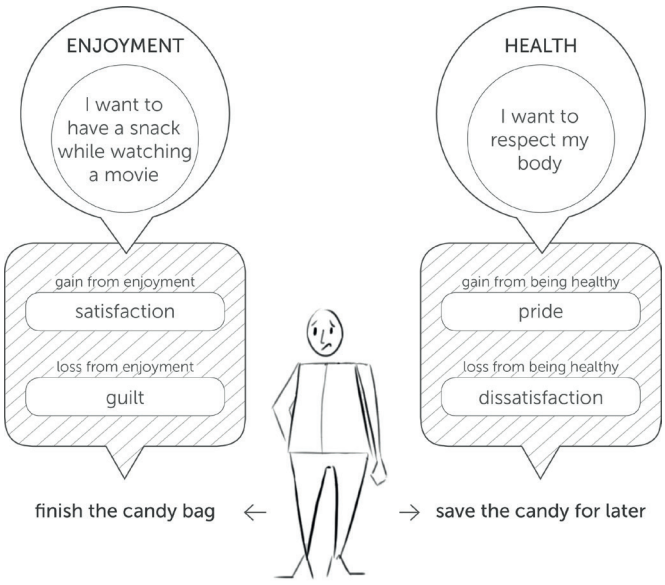
EPILOGUE

Design can aspire to address pervasive real-life challenges. It can contribute to solutions for societal issues like obesity, sustainability, social exclusion, or mental ill-health. When dealing with such complex issues, designers often focus on what is considered to be *wrong* in the current situation. That is perfectly sensible: understanding the problem at hand creates opportunities for designing interventions that contribute to a positive change. Designers are well equipped to do this; they are trained to identify appropriate problems and to envision future situations that, once designed, reduce or prevent these problems. But there is also the 'other side of the coin': that is, what is *right* about the current situation. This thesis focused on that other side, which is equally important in the analysis of problems to be addressed. There is always a reason why things are wrong. There is a gain that hides behind the loss represented by the problem, and design is best informed by the awareness of these gains and losses involved in the context of design. Children are drawn to sugary snacks, not because they want to be unhealthy, but because they love the taste. Parents buy these snacks, not because they want their children to be unhealthy, but because they like to give their children a treat that makes them happy. By understanding both sides of the coin, we can focus our attention on designing solutions that can strike a balance between potential gains and losses. The contribution of this thesis, in a nutshell, is this more inclusive understanding of design problems, in which we do not only ask ourselves what is wrong about the situation, but also what is right in the situation that we consider to be wrong. I hope to have convinced you that the answer is hidden in dilemma thinking.

SUMMARY

You have bought a bag of candy to keep yourself entertained while watching movies in the comfort of your home. Your intention is to keep the candy bag in your cabinet for several weeks, and to only treat yourself with some candy when watching movies. However, you somehow find the bag emptied while watching your first movie. And although eating the delicious candy by the handful was certainly enjoyable, you also feel guilty for finishing the entire bag at once. This is only one example of many dilemmas we encounter in everyday life. In this thesis, dilemmas are defined as experiences with three main ingredients: (1) mutually exclusive choices, (2) conflicting concerns, and (3) mixed emotions. Figure 1 shows the framework of dilemmas, which illustrates these ingredients related to the conflict between enjoying candy while watching a movie versus eating moderately to maintain good health (see Chapter 5). The articulation of these three ingredients enables us to provide a more elaborate definition of dilemmas: People experience a dilemma when they are faced with two mutually exclusive choices, both of which touch upon their personal concerns, and the simultaneous fulfillment of both choices is challenging, if not impossible, to obtain or achieve. Because of this challenge, people experience both positive and negative emotions toward each alternative.

Figure 1.
Framework of dilemmas



Aim of this thesis

The main aim of this thesis was to (a) increase our understanding of how personal dilemmas can inform user-centered design, and to (b) develop design aids that support designers in integrating users' dilemmas in their design processes. The following paragraphs summarize how these goals were fulfilled through three main headings: (1) The role of design in addressing dilemmas, (2) identifying relevant and inspiring dilemmas, and (3) creating design ideas to address personal dilemmas.

The role of design in addressing dilemmas

Designers can address dilemmas most evidently through *resolving* them (see Chapter 4). For instance, many food products, such as low-fat ice cream, sugar-free candy, or exotic fruit salads, can resolve the dilemma between health and indulgence, and thus, they create a win-win situation. Figure 2 shows three concepts generated in the context of this thesis to resolve particular dilemmas experienced when having breakfast.[1] 'Dare and Share' allows showing intimacy by sharing breakfast, *while* enjoying a personal moment; 'Break on the Go' enables a comfortable start of the day *without* compromising from efficiency; and 'One-bite Crunch' facilitates enjoying surprising flavors *without* having to plan and prepare each flavor. By focusing on the conflict between two concerns, instead of either concern in isolation, these concepts creatively tackle an emotional duality and thus offer pleasurable product experiences.

The second design direction this thesis proposes is *moderating dilemmas* (see Chapter 5). Products that moderate dilemmas aim to have a motivating effect on users by suggesting which goals to prioritize. This design direction has been explored in the theoretical context of self-control dilemmas, where the fulfillment of long-term goals (or personal values) is prioritized over the fulfillment of immediate desires (see Chapter 5). In light of the functional differences between these constructs, an opportunity for design is to support people's self-control efforts to withstand immediate desires that interfere with long-term goals. Figure 3 shows two design ideas that

1 The brief for these concepts, which was given by multinational food company, was to develop energizing breakfast cereal concepts for young adults. The design team (twenty master-level design students) first identified relevant and inspiring dilemmas experienced in the context of having breakfast. These dilemmas were then used as the basis for developing their design concepts.

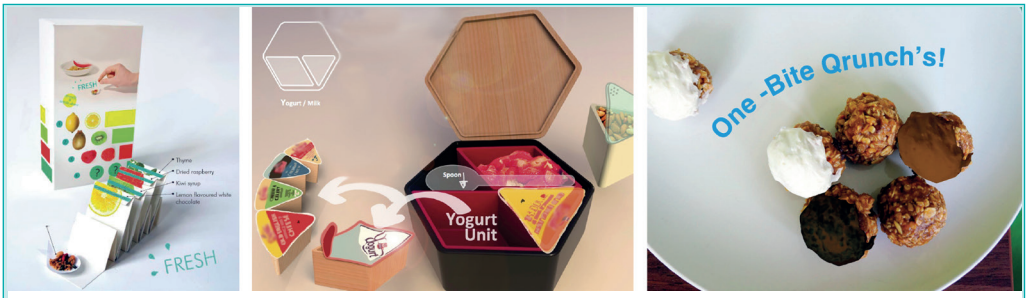


Figure 2. *Three Concepts that intend to resolve dilemmas: (a) Dare and Share; (b) Break on the Go; (c) One-bite Crunch*

"Dare and Share" addresses the conflict between "I want to nurture relationships" and "I want to enjoy my personal time." The design goal was to enable consumers to nurture their relationship while they are having a moment of personal time. The concept is a cereal box that includes a large bag and seven separately packed spoon-sized pockets. Users can leave a small pocket on the kitchen table for their partner as an expression of intimacy after enjoying their personal moment of having breakfast. Designed by Arjen Oenema, 2012. (Reprinted with permission.)

"Break on the Go" addresses the conflict between "I want to have my breakfast in peace" and "I want to be on time for work." The design goal was to brighten up the on-the-go breakfast experience by using the pleasures of having a breakfast at home. The design is a breakfast box that allows users to pack their cereal, yoghurt and fruit combinations, to eat on-the-go. The lid of the bag opens in such a way that it forms a barrier between the users and their environment, enabling a 'private and cozy' eating experience. Designed by Wan-Jen Jenny Tsay, 2012. (Reprinted with permission.)

"One-bite Crunch" addresses the conflict between "I want to add surprising ingredients to my breakfast," and "I want to manage my time in the morning." The design goal was to create convenient surprises. The design is a box with bite-size cereal balls that surprise consumers with different flavors while allowing them to enjoy their breakfast in an efficient way. Designed by Shannon Chang, 2012. (Reprinted with permission.)

illustrate this design direction. Both design ideas address the conflict between "I want to be a responsible person" and "I want to relax". Jumpy, Figure 3(a), is an idea for an alarm clock that subtly punishes the user for lingering in bed instead of getting up at a pre-planned time. The punishment here is the time and effort the user invests in replacing the balls that gets detached from the alarm clock with every press of the snooze button. Alternatively, Chocolate To-Do List, Figure 3(b), provides an incentive to completing tasks the user is often reluctant to start (e.g., paying bills, calling someone, cleaning one's apartment). The user is rewarded by a small piece of chocolate for completing a task, similar to the joy of scratching a task off one's paper to-do list.[2]

2 Marc Bayona volunteered to participate in a three-week ideation process, during which he identified a self-control dilemma based on personal experience and used these dilemmas to generate ideas.

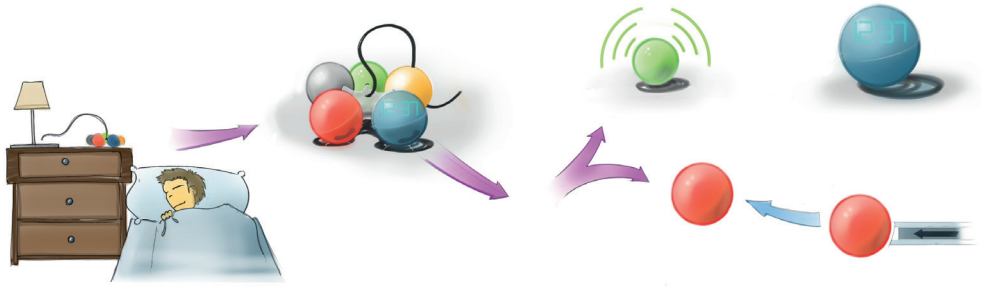


Figure 3(a). Jumpy alarm clock

"Jumpy alarm clock" addresses the conflict between 'being responsible' and 'wanting to relax'. It uses unpleasant sensory stimulus (light and sound) and physical effort to discourage oversleeping. The alarm clock is composed of five colorful, detachable balls, which are pushed off the clock with every press of the snooze button. As they jump off, the balls make an alarming sound and emit bright colors similar to fireworks. If the person is still in bed by the time all five balls are scattered around the bedroom, the user has to search for them when he needs to set the alarm clock for the next day. Designed by Marc Bayona, 2013. (Reprinted with permission.)

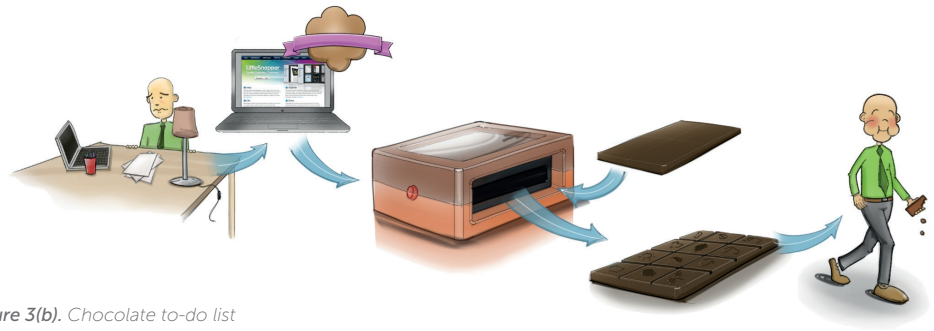


Figure 3(b). Chocolate to-do list

"Chocolate to-do list" addresses the conflict between 'being responsible' and 'wanting to relax'. Most people find it enjoyable to scratch completed tasks off their to-do list, which gives a sense of achievement and relief. Chocolate to-do list is a product-service combination that aims to enhance this experience in order to prevent people from delaying ordinary tasks. This service gets one's weekly to-do list printed on pieces of a chocolate bar so that one can enjoy finishing a task by biting off a chocolate piece. Designed by Marc Bayona, 2013. (Reprinted with permission.)

The third design direction this thesis suggests is *triggering dilemmas* (see Chapter 6). This design direction has been explored in the context of designing for provocation, where raising questions and debate is the main design aim (see Chapter 6). The suggestion here is that triggering a dilemma, (i.e., emphasizing the conflict between two personal concerns), can be a means to design for provocation. Therefore, understanding the methodical basis of triggering dilemmas can increase the adoption of provocative design by a larger group of design

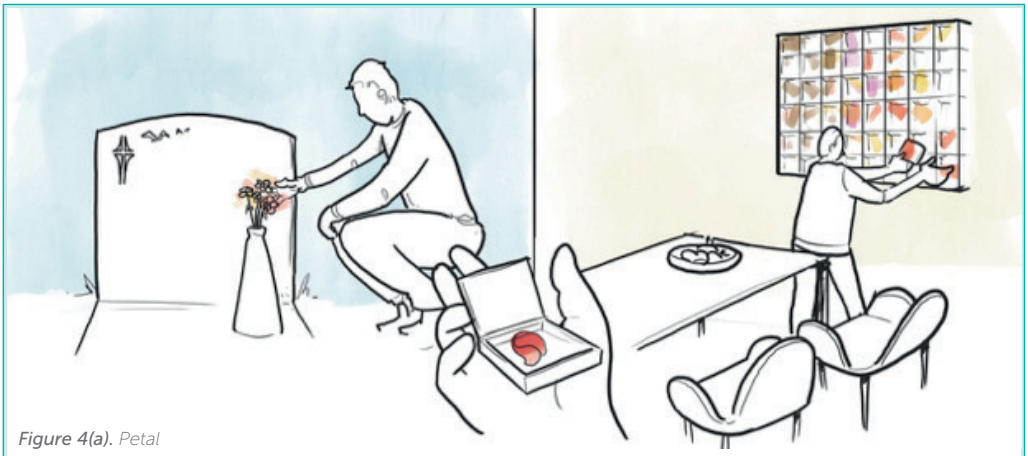


Figure 4(a). *Petal*

"Petal" addresses the conflict between "I want to visit the grave of my loved one everyday" and "I want to move on with my life". It is an organically changing wall piece that subtly reminds the person to visit the grave of a loved one, while also encouraging him to move on with his life. After placing a bouquet of flowers on a grave, the person can bring back one petal and place it in one of the glass boxes of the wall piece. With time, the degrading petals will remind the person how long it has been since his last visit to the cemetery. At the same time, the increasing number of withered petals will symbolize the time spent grieving. Designed by Sofia Hnatiuk, Rozemarijn Klein Heerenbrink, Bob van Iersel, and Jaap Meijer, 2015. (Reprinted with permission.)

Figure 4(b). *Object called 'Reflective Mind'*

"Reflective Mind" addresses the conflict between "I want to keep up to date with everything that is happening online" and "I want to be mindful of my environment". Reflective Mind is an interactive installation placed in public bathrooms, and it is a response to the modern phenomenon, 'fear of missing out'. It consists of a series of small mirrors that bring user's attention to the present. These pieces move frantically when they detect a phone signal. In the absence of a signal, the pieces follow the movements of the surrounding, such as a waving hand. The idea is that people, who are fascinated by the unfamiliar object, will abandon their smartphones and pay attention to the movements of the mirrors, similar to paying attention to breathing patterns when meditating. Designed by Marga Una Borras, Jens de Groot, Arie de Kam, Jaap Meijer, and Minon Rosier, 2015. (Reprinted with permission.)

practitioners. Figure 4 shows two design ideas that illustrate this design direction. "Petal", Figure 4(a), triggers a dilemma through emphasizing the presence of conflicting concerns in a tangible form. In this regard, it is a symbolic embodiment of the dilemma. Most importantly, it does not judge a particular choice as more appropriate than the other (stopping to visit the grave of the loved one or moving on with life). Alternatively, "Reflective Mind", Figure 4(b), triggers a dilemma in interaction with the product. Its size and placement attracts attention and invites users to explore it. During the interaction, the movements of the mirrors maintain users' attention, helping them to focus on the present instead of their phone. This interaction is intended as an enticing barrier to checking updates on a mobile phone.

Identifying relevant and inspiring dilemmas

Designing with dilemmas always requires identifying the main dilemmas relevant for a given design brief. This can be achieved through a number of methods, such as in-depth interviewing and experience sampling (see Chapter 7). To ensure the effectiveness of the design process as well as the quality of the design outcome, it is imperative that designers identify relevant and inspiring, i.e., 'design-worthy' dilemmas as input for idea generation (see Chapter 3). This thesis proposes that designers can capture, analyze, and (re-)formulate dilemmas in the form of a reflective dialogue during problem framing. Two theoretical insights have been offered that can assist this dialogue. These are seven key qualities of design-worthy dilemmas (see Chapter 3) and three levels of personal dilemmas (see Chapter 4).

1. Qualities of design-worthy dilemmas (see Chapter 3):
   The variety of dilemma-driven design cases discussed in this thesis show that selecting a design-worthy dilemma might be a challenge due their abundance and diversity in everyday context. The key qualities of design-worthy dilemmas explicate the main design considerations used when selecting a target dilemma. These qualities are (1) *relevance*, the impact of addressing a dilemma on future users, (2) *inspiration*, the selected dilemma's potential to inspire design ideas, and (3) *meaningful formulation*, the effort to reformulate dilemmas at varying abstraction levels to form an advantageous design space. These qualities can guide reflection and discussion when selecting a target dilemma, and as such, can facilitate defining an appropriate design problem.

2. Three levels of personal dilemmas (see Chapter 4): Although dilemma is a phenomenon that is relevant for everyday life, people, particularly when they are asked, cannot always articulate their concerns and concern conflicts in a way that is immediately relevant for designing. Because of this, these concerns and concern conflicts need to be carefully analyzed and framed in a way that creates a meaningful design space. One way of framing concerns is through formulating them in various abstraction levels. Three levels of personal dilemmas is a theoretical framework that guides formulating concerns in three distinct levels of abstraction, and thus, forming dilemmas through combining concerns at different abstraction levels. Implementing these levels in a design project revealed that dilemmas at all three abstraction levels can be an input for ideation, with the most abstract yet still informative concern combination being the most inspiring dilemma formulation.

Creating design ideas to address personal dilemmas

Framing a design problem takes designers only (nearly) halfway through the conceptual design process – what about creating design ideas? This thesis proposes a set of design strategies to support the implementation of each design direction that can address dilemmas (i.e., resolving, moderating, and triggering).

To *resolve dilemmas*, four design strategies have been suggested based on a categorization of ideas created using this design direction (see Chapter 4). The strategies are blending, fixing, designing flexibility into the product, and introducing new designs. For instance, 'Dare & Share' and 'Break on the Go' (Figure 2) are examples of introducing new designs, because they address a given conflict through exploring product categories (e.g., new packaging for cereal, a complementary breakfast box) that are new to the existing category (i.e., breakfast cereal). In addition, One-bite Crunch (Figure 2) is an example of fixing, because it modifies an already-existing cereal concept (bite-sized cereal balls) through adding new, surprising flavors.

To *moderate dilemmas*, three symmetrical design strategies have been suggested based on empirical research and self-control theories (see Chapter 5). These strategies aim to either demotivate temptations by adding new sources of displeasure, making potential losses tangible, and creating barriers; or to motivate long-term goals by

adding new sources of pleasure, making potential gains tangible, and creating enablers. For instance, Jumpy (Figure 3) adds new sources of displeasure to oversleeping. Alternatively, Chocolate to-do (Figure 3) list adds new sources of pleasure to completing tasks on one's to-do list.

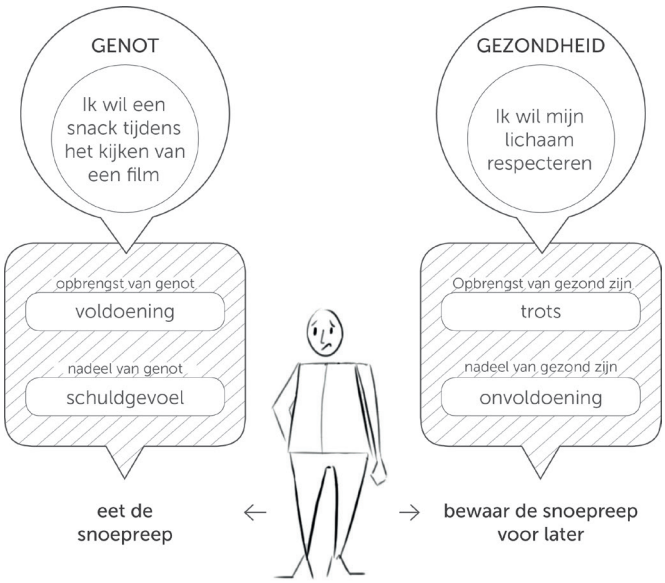
To *trigger dilemmas*, three design strategies have been suggested based on an expert analysis of existing products, namely embodied symbols, forced choices, and behavior barriers (see Chapter 6). For instance, Petal (Figure 4) is based on the strategy, embodied symbols. In this idea, the degrading petals symbolize the time spent grieving, whereas the number of petals symbolizes one's commitment to loss. In addition, Reflective Mind (Figure 4) aligns with the strategy, behavior barriers.

The main aim of this thesis was to provide the knowledge and tools that can enable user-centered designers in recognizing and utilizing the potential of dilemmas as a design-relevant phenomenon. Dilemma-driven design can help designers in increasing their reflective capacity when making decisions that will have an impact on people's everyday experiences, and ultimately, on their subjective wellbeing. In this way, it promises to enrich the impact of products and services on the fulfillment people derive from their choices – whether the choice is about enduring the pain of wearing an elegant pair of shoes, overcoming the desire to repeatedly snooze an alarm clock, or embracing the guilt of finishing an entire bag of candy.

SAMENVATTING

Je hebt een zak snoep gekocht om jezelf bezig te houden tijdens het kijken van een film. Het is je bedoeling om de zak snoep minstens een aantal weken in de kast te houden, en om jezelf alleen te belonen met een paar snoepjes tijdens het kijken van een film. Echter, op de een of andere manier blijkt de zak al leeg te zijn halverwege de eerste film. En hoewel het eten van de heerlijke snoepjes met handenvol tegelijk zeker lekker was, voel je je ook schuldig voor het opmaken van de hele zak in één keer. Dit is slechts een voorbeeld van een van de vele dilemma's die we tegenkomen in ons dagelijks leven. In dit proefschrift worden dilemma's gedefinieerd als ervaringen met drie belangrijke ingrediënten: (1) keuzes die elkaar uitsluiten, (2) tegenstrijdige belangen, en (3) gemengde emoties. Figuur 1 toont het framework van dilemma's en illustreert deze ingrediënten aan de hand van het conflict tussen; snoep eten tijdens het kijken naar een film, tegenover gematigd eten om in goede gezondheid te blijven (zie hoofdstuk 5). Het formuleren van deze drie ingrediënten maken het mogelijk om een preciezere definitie van dilemma's te geven: mensen ervaren een dilemma wanneer ze geconfronteerd worden met twee elkaar uitsluitende keuzes, die beiden aan persoonlijke belangen raken, en waarin de gelijktijdige voldoening van beide keuzes moeilijk, en misschien zelfs onmogelijk, is. Door deze uitdaging ervaren mensen zowel positieve en negatieve emoties aangaande beide alternatieven.

Figuur 1.
Framework van dilemma's



Doel van dit proefschrift

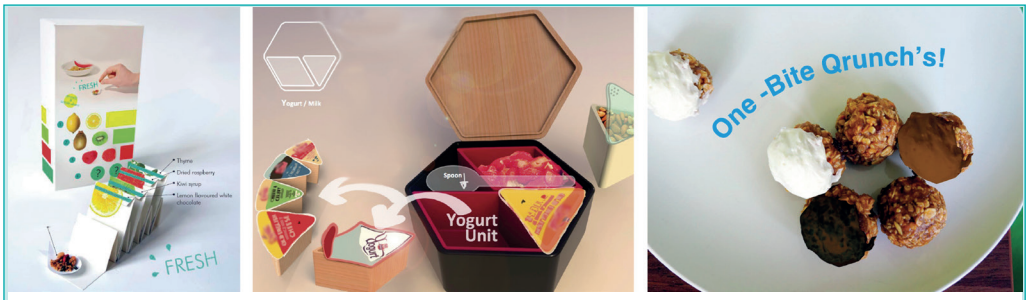
Het hoofddoel van dit proefschrift was om (a) ons inzicht te vergroten in hoe persoonlijke dilemma's user-centered design kunnen informeren, en om (b) hulpmiddelen te ontwikkelen die ontwerpers helpen om dilemma's van gebruikers in hun ontwerpprocessen te integreren. De komende paragrafen vatten samen hoe deze doelen zijn bereikt aan de hand van drie hoofdonderwerpen: (1) De rol van ontwerpen in het adresseren van dilemma's, (2) het identificeren van relevante en inspirerende dilemma's, en (3) ontwerp ideeën creëren rondom persoonlijke dilemma's.

De rol van ontwerp in het adresseren van dilemma's

Het ligt voor de hand dat ontwerpers dilemma's aan kunnen pakken door ze *op te lossen* (zie hoofdstuk 4). Bijvoorbeeld, veel voedselproducten, zoals low-fat ijsjes, suikervrij snoep, of exotische fruitsalades, kunnen het dilemma tussen gezondheid en genot oplossen, en zo een win-win situatie creëren. Figuur 2 toont drie concepten die gegenereerd zijn binnen de context van dit proefschrift om een specifiek dilemma tijdens het ontbijt op te lossen.[1] 'Dare and Share' maakt het mogelijk om intimiteit te tonen door het delen van een ontbijt, en *tegelijkertijd* te genieten van een persoonlijk moment; 'Break on the Go' maakt het mogelijk om de dag comfortabel te beginnen, *zonder* in te leveren op efficiëntie; en 'One-bite Crunch' zorgt ervoor dat verrassende smaken kunnen worden geproefd, *zonder* elke smaak te moeten plannen en voorbereiden. Door te focussen op het conflict tussen twee belangen, in plaats van op ieder belang apart, lossen deze concepten op een creatieve manier een emotionele dualiteit op en op die manier bieden ze een plezierige product ervaring.

De tweede ontwerprichting voor dilemma's die dit proefschrift voorstelt is *moderatie* (zie hoofdstuk 5). Producten die dilemma's modereren hebben als doel om gebruikers te motiveren door te suggereren bij welk doel een gebruiker prioriteit moet leggen. Deze ontwerprichting is onderzocht binnen het theoretisch kader van zelfbeheersingsdilemma's, waarbij de vervulling van lange termijn

1 De opdracht voor deze concepten, gegeven door een internationaal voedselbedrijf, was om een verkwikkend ontbijtgranen concept te ontwikkelen voor jongvolwassenen. Het ontwerpteam (twintig ontwerpstudenten op masterniveau) identificeerde eerst relevante en inspirerende dilemma's die ervaren worden tijdens het ontbijt. Deze dilemma's zijn vervolgens gebruikt als basis voor de ontwikkeling van ontwerpconcepten.



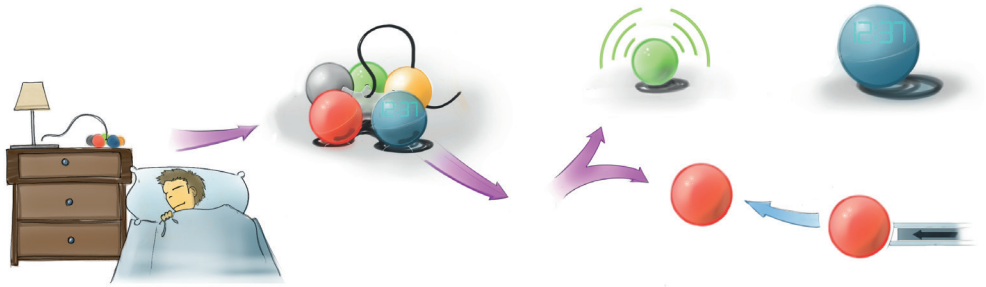
Figuur 2. Drie concepten met de intentie om dilemma's op te lossen: (a) Dare and Share; (b) Break on the Go; (c) One-bite Crunch

"Dare and Share" adresseert het conflict tussen "Ik wil relaties koesteren" en "Ik wil tijd voor mezelf". Het ontwerpdoel was om consumenten de kans te geven om hun relatie te koesteren terwijl ze een eigen persoonlijk moment hebben. Het concept is een ontbijtgranen doos met daarin één grote zak en zeven los verpakte eenhaps-zakjes. Gebruikers kunnen een klein zakje op de keukentafel laten liggen voor hun partner om intimiteit uit te drukken, na het genieten van een persoonlijk moment tijdens het ontbijt. Ontworpen door Arjen Oenema, 2012. (Overgenomen met toestemming.)

"Break on the Go" adresseert het conflict tussen "Ik wil mijn ontbijt in alle rust opeten" en "Ik wil op tijd komen op mijn werk". Het ontwerpdoel was om het on-the-go ontbijt te verbeteren door gebruik te maken van de voordelen van het thuis eten van een ontbijt. Het ontwerp is een ontbijtgranen doos waarin gebruikers hun ontbijtgranen, yoghurt en combinaties van fruit kunnen verpakken om onderweg op te eten. De deksel van de box kan zo geopend worden dat het een barrière vormt tussen de gebruikers en hun omgeving, en kan op die manier de gebruiker in de gelegenheid stellen om een ontbijt 'privé en knus' op te eten. Ontworpen door Wan-Jen Jenny Tsay, 2012. (Overgenomen met toestemming.)

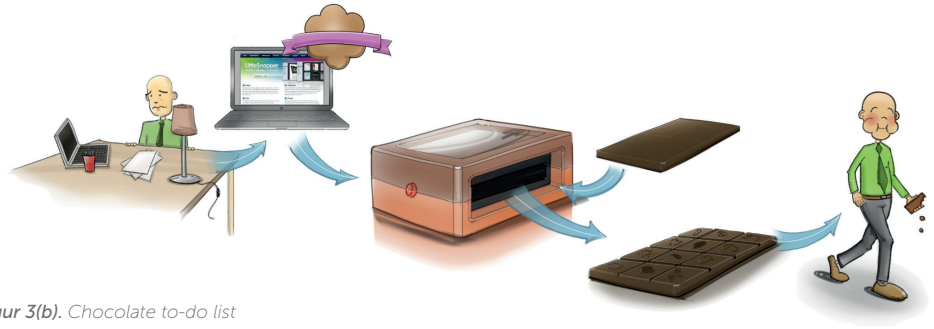
"One-bite Crunch" adresseert het conflict tussen "Ik wil verrassende elementen aan mijn ontbijt toevoegen" en "Ik wil handig met mijn tijd omgaan in de ochtend". Het ontwerpdoel was om gemakkelijke verrassingen te creëren. Het ontwerp is een doos met eenhaps-balletjes van ontbijtgranen die gebruikers verrassen met verschillende smaken en tegelijkertijd voor een efficiënt ontbijt zorgen. Ontworpen door Shannon Chang, 2012. (Overgenomen met toestemming.)

doelen (of persoonlijke waarden) voorrang heeft boven de vervulling van onmiddellijke verlangens (zie hoofdstuk 5). In het licht van de functionele verschillen tussen deze constructen, is er een kans voor ontwerp om mensen te ondersteunen in hun zelfbeheersing en inspanningen om onmiddellijke verlangens, die interfereren met doelstellingen op lange termijn, te weerstaan. Figuur 3 toont twee ontwerp ideeën die deze ontwerprichting illustreren. Beide ontwerp ideeën pakken het conflict tussen 'Ik wil een verantwoordelijk persoon zijn' en 'ik wil me ontspannen' aan. "Jumpy", figuur 3(a), is een idee



Figuur 3(a). *Jumpy alarm clock*

"Jumpy alarm clock" richt zich op het conflict tussen 'verantwoordelijk zijn' en 'willen relaxen'. Het maakt gebruik van onaangename sensorische stimuli (licht en geluid) en fysieke inspanning om te veel slapen te ontmoedigen. De wekker is samengesteld uit vijf kleurrijke, afneembare ballen, die met elke druk op de snooze-knop van de wekker geduwd worden. Als ze eraf springen, maken de ballen een alarmerend geluid en lichten ze op in heldere kleuren, vergelijkbaar met vuurwerk. Als de persoon nog in bed ligt als alle vijf de ballen verspreid over de slaapkamer liggen, moet de gebruiker ze zoeken voordat hij de wekker kan zetten voor de volgende dag. Ontworpen door Marc Bayona, 2013. (Overgenomen met toestemming.)



Figuur 3(b). *Chocolate to-do list*

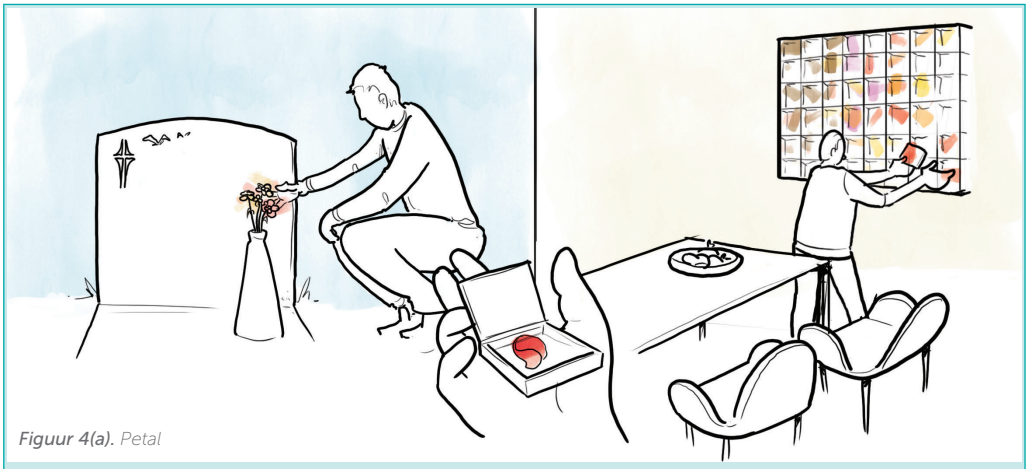
"Chocolate to-do list" richt zich op het conflict tussen 'verantwoordelijk zijn' en 'willen relaxen'. De meeste mensen vinden het leuk om voltooide taken door te krassen op hun to-do lijst. Het geeft ze een gevoel van voldoening en opluchting. "Chocolate to-do list" is een combinatie van een product en een dienst en is bedoeld om te voorkomen dat mensen hun dagelijkse taken uitstellen. Via deze dienst krijg je je wekelijkse to-do lijst op stukjes van een chocoladereep gedrukt, zodat je kan genieten van het voltooien van een taak door een stukje chocola af te bijten. Ontworpen door Marc Bayona, 2013. (Overgenomen met toestemming.)

voor een wekker die de gebruiker subtiel straft voor het in bed blijven hangen in plaats van op te staan op het geplande tijdstip. De straf is in dit geval de tijd en moeite die een gebruiker moet investeren in het terugplaatsen van ballen die elke keer dat er op de snooze knop gedrukt wordt, losraken van de wekker. Daarnaast biedt "Chocolate To-Do List", figuur 3(b), een stimulans om taken te voltooien waar de gebruiker geen zin in heeft (bijv., het betalen van rekeningen, iemand bellen, je huis schoonmaken). De gebruiker wordt beloond met een

klein stukje chocola als een taak voltooid is, vergelijkbaar met het plezier van het doorkrassen van een taak op een papieren to-do-lijst.[2]

De derde ontwerprichting die dit proefschrift voorstelt is het *activeren ("triggering") van dilemma's*. Deze ontwerprichting is onderzocht in het kader van ontwerpen voor provocatie, waarbij het uitlokken van vragen en debat het belangrijkste ontwerp doel is (zie hoofdstuk 6). Het activeren van een dilemma, (dat wil zeggen, het benadrukken van een conflict tussen twee verschillende persoonlijk belangen), kan een middel voor ontwerpen voor provocatie zijn. Begrip van de methodologische basis van het activeren van dilemma's van daarom zorgen voor een verhoogd gebruik van provocatief ontwerpen in de praktijk. Figuur 4 toont twee ontwerpideeën die deze ontwerprichting illustreren. "Petal", figuur 4(a), lokt een dilemma uit door de aanwezigheid van tegenstrijdige belangen tastbaar te maken. In dat opzicht is het een symbolische weergave van het dilemma. Maar het belangrijkst is dat het concept geen oordeel geeft over een bepaalde keuze (stoppen met het bezoeken van het graf van een geliefde of doorgaan met het leven). "Reflective Mind", figuur 4(b), lokt een dilemma uit tijdens de interactie met het product. De grootte en plaatsing van het product trekken de aandacht en nodigen gebruikers uit om het te verkennen. Tijdens de interactie met het product, houdt de beweging van de spiegels de aandacht van de gebruikers vast en helpt de gebruiker om zich te concentreren op het nu in plaats van op zijn telefoon. Deze interactie is bedoeld als een verleidelijke barrière voor het checken van updates op een mobiele telefoon.

2 Marc Boyona nam vrijwillig deel aan een idee generatie proces van drie weken. Gedurende dit proces identificeerde hij zelfbeheersingsdilemma's, gebaseerd op persoonlijke ervaringen, en gebruikte hij deze dilemma's om ideeën te genereren.



Figuur 4(a). Petal

"Petal" richt zich op het conflict tussen "Ik wil het graf van mijn geliefde elke dag bezoeken" en "Ik wil verder met mijn leven". Het is een organisch veranderende wandkast die de gebruiker er op subtiele wijze aan herinnert om het graf van een dierbare te bezoeken, en hem tegelijkertijd aanmoedigt om door te gaan met zijn leven. Na het neerleggen van een boeket op het graf, kan de gebruiker een bloemblaadje mee terug nemen en in een van de glazen doosjes in de wandkast plaatsen. Na verloop van tijd, zullen de verwelkende bloemblaadjes de gebruiker herinneren aan hoe lang het geleden is sinds zijn laatste bezoek aan de begraafplaats. Tegelijkertijd symboliseert het toenemende aantal verwelkte bloemblaadjes de tijd die besteed is aan het rouwen. Ontworpen door Sofia Hnatiuk, Rozemarijn Klein Heerenbrink, Bob van Iersel, and Jaap Meijer, 2015. (Overgenomen met toestemming.)

Figuur 4(b). Object genaamd 'Reflective Mind'

"Reflective Mind" richt zich op het conflict tussen "Ik wil op de hoogte blijven van alles wat er online gebeurt" en "Ik wil bewust zijn van mijn omgeving". Reflective Mind is een interactieve installatie, geplaatst in openbare toiletten, en het is een antwoord op het moderne fenomeen 'de angst om iets te missen'. Het product bestaat uit een reeks kleine spiegels die de aandacht van de gebruiker naar het heden brengen. Deze spiegels gaan razendsnel bewegen wanneer ze een telefoon signaal detecteren. Als er geen telefoon signaal is, volgen de spiegels de bewegingen uit de omgeving, zoals bijvoorbeeld een zwaaiende hand. Het idee is dat mensen gefascineerd zijn door het onbekende object en hun aandacht op het bewegingen van de spiegels zullen vestigen en hun mobiele telefoons zullen laten voor wat ze zijn. Net zoals bij het focussen op ademhalingspatronen tijdens meditatie. Ontworpen door Marga Una Borras, Jens de Groot, Arie de Kam, Jaap Meijer, and Minon Rosier, 2015. (Overgenomen met toestemming.)

Het identificeren van relevante en inspirerende dilemma's

Bij ontwerpen met dilemma's is het belangrijk om de hoofddilemma's binnen een gegeven ontwerpopgave te identificeren. Dit kan worden gedaan aan de hand van een aantal methoden, zoals interviews en 'experience sampling' (zie hoofdstuk 7). Om de effectiviteit van het ontwerpproces en de kwaliteit van het ontwerpresultaat te waarborgen, is het noodzakelijk dat ontwerpers relevante en inspirerende, dat wil zeggen 'ontwerp-waardige', dilemma's identificeren als input voor de idee-generatie (zie hoofdstuk 3). Dit proefschrift stelt dat ontwerpers dilemma's kunnen vastleggen, analyseren en (her)formuleren tijdens het kaderen van het probleem in de vorm van een reflectieve dialoog. Twee theoretische inzichten worden aangedragen om deze dialoog te ondersteunen. Namelijk, de zeven belangrijkste eigenschappen van ontwerp-waardige dilemma's (zie hoofdstuk 3) en de drie niveaus van persoonlijke dilemma's (zie hoofdstuk 4).

1. Eigenschappen van ontwerp-waardige dilemma's (zie hoofdstuk 3):
   De verscheidenheid van dilemma-gestuurde ontwerpopgaven, beschreven in dit proefschrift, laat zien dat de overvloed en diversiteit van dilemma's in het dagelijks leven een uitdaging kunnen vormen voor het selecteren van een ontwerp-waardig dilemma. De belangrijkste eigenschappen van een ontwerp-waardig dilemma geven inzicht in de overwegingen die gemaakt moeten worden tijdens het selecteren van een dilemma. Deze eigenschappen zijn (1) *relevantie;* de impact van het dilemma op toekomstige gebruikers, (2) *inspiratie;* de potentie van het geselecteerde dilemma om ontwerp ideeën te inspireren, en (3) *zinvolle formulering;* de inspanning die het kost om het dilemma te herformuleren op verschillende abstractieniveaus om zo een gunstige ontwerpruimte te creëren. Deze eigenschappen kunnen helpen bij de reflectie en discussie tijdens het selecteren van een dilemma, en zo het definiëren van een passend ontwerpprobleem vergemakkelijken.

2. Drie niveaus van persoonlijke dilemma's (zie hoofdstuk 4):
   Hoewel het dilemma een relevant fenomeen is voor het dagelijks leven, kunnen mensen, vooral wanneer zij er om gevraagd worden, niet altijd hun conflicterende belangen onder woorden brengen op een manier die direct bruikbaar is voor ontwerp. Daarom moeten

deze conflicterende belangen zorgvuldig geanalyseerd en gekaderd worden door ze in verschillende abstractieniveaus te formuleren. 'Drie niveaus van persoonlijke dilemma's is een theoretisch framework dat het formuleren van belangen op drie verschillende niveaus mogelijk maakt. Het combineren van belangen op verschillende abstractieniveaus maakt het mogelijk om dilemma's te formuleren. Tijdens het implementeren van dilemma's op verschillende abstractieniveaus in een ontwerpproject, bleek dat alle drie de abstractieniveaus input kunnen zijn voor ideegeneratie. Daarbij bleek dat de meest inspirerende formulering van dilemma's op het meest abstracte, en toch nog informatieve, niveau lag.

Het creëren van ontwerp ideeën om persoonlijke dilemma's aan te pakken

Het kaderen van een ontwerpprobleem brengt ontwerpers maar (bijna) halverwege het conceptuele ontwerpproces – maar hoe zit het dan met het creëren van ontwerp-ideeën? Dit proefschrift stelt een reeks ontwerp strategieën voor die de implementatie van de ontwerprichtingen om dilemma's aan te pakken (namelijk, oplossen, modereren en activeren) kunnen ondersteunen.

Om dilemma's op te lossen worden vier ontwerp strategieën voorgesteld, gebaseerd op de categorisatie van ideeën die gecreëerd zijn met vanuit deze ontwerprichting (zie hoofdstuk 4). De strategieën zijn: vermengen, oplossen, flexibiliteit in het product brengen en het introduceren van nieuwe ontwerpen. 'Dare &Share' en 'Break on the Go' (figuur 2) zijn voorbeelden van het introduceren van nieuwe ontwerpen, omdat ze een gegeven conflict aanpakken door nieuwe productcategorieën te verkennen (in dit geval een verpakking voor ontbijtgranen en een bijgevoegde ontbijt box) binnen de huidige categorie (ontbijtgranen). Daarnaast is 'One-bite Crunch' (figuur 2) een voorbeeld van oplossen, omdat het een bestaand ontbijtgranen concept (eenhaps-balletjes) aanpast door nieuwe verrassende smaken toe te voegen.

Om dilemma's te modereren worden drie symmetrische ontwerp strategieën voorgesteld, gebaseerd op empirisch onderzoek en zelfbeheersings-theorieën (zie hoofdstuk 5). Deze strategieën hebben als doel; ofwel om verleidingen minder aantrekkelijk te maken door nieuwe bronnen van ongenoegen toe te voegen en zo potentiele

verliezen tastbaar te maken en barrières op te werpen; ofwel te motiveren voor lange termijn doelen door nieuwe bronnen van plezier en zo potentiele voordelen tastbaar te maken en aanleidingen te creëren. 'Jumpy' (figuur 3) voegt bijvoorbeeld nieuwe bronnen van ongemak toe aan te lang slapen. Daarnaast voegt 'Chocolate to-do' (figuur 3) nieuwe bronnen van plezier toe aan het vervullen van taken op een to-do lijst.

Om dilemma's te activeren worden drie strategieën voorgesteld, namelijk: symbolische weergave, geforceerde keuzes, en barrières voor gedrag (zie hoofdstuk 6). Deze strategieen zijn gebaseerd op een analyse van bestaande producten door deskundigen. 'Petal' (figuur 4) is bijvoorbeeld gebaseerd op de strategie 'symbolische weergave'. In dit idee symboliseren de verwelkende blaadjes de tijd die besteed is aan rouwen, en het aantal blaadjes symboliseert iemands betrokkenheid bij het verlies. Reflective Mind (figuur) past bij de strategie waarbij barrières worden opgelegd voor bepaald gedrag.

Het belangrijkste doel van dit proefschrift was om kennis en tools te bieden die user-centered ontwerpers kunnen helpen bij het herkennen en gebruiken van de potentie van dilemma's als ontwerp-relevant fenomeen. Dilemma-gedreven ontwerp kan ontwerpers helpen om hun reflectief vermogen te vergroten bij het maken van beslissingen die impact hebben op alledaagse ervaringen, en uiteindelijk op het subjectieve welzijn, van mensen. Op deze manier, beloofd dilemma-gedreven ontwerp de impact van producten en diensten op de voldoening die mensen halen uit hun keuzes te verrijken – of dat nu de keuze is tussen het verdragen van pijn en het dragen van een elegant paar schoenen, het overwinnen van de behoefte om herhaaldelijk te snoozen, of het omarmen van het schuldgevoel bij het leegeten van een hele zak snoep.

REFERENCES

Altshuller, G. S. (1988). *Creativity as an Exact Science: The Theory of Inventive Problem Solving.* New York: Gordon and Breach.

Andreasen, M. M. (2003). Improving design methods' usability by a mindset approach. In Udo Lindeman (Ed.), *Human Behavior in Design* (pp. 209–218). Springer Berlin Heidelberg.

Andreasen, M. M., Hansen, T. C., & Cash, P. (2015). *Conceptual Design: Interpretation, Mindset, and Models.* Switzerland: Springer.

Arnold, M. B. (1960). *Emotion and Personality (Vol. 1): Psychological Aspects.* New York, NY: Colombia University Press.

Austin, J. T., & Vancouver, J. B. (1996). Goal constructs in psychology: Structure, process, and content. *Psychological Bulletin, 120*(3), 338–375.

Baele, J., Dusseldorp, E., & Maes, S. (2001). Condom use self-efficacy: Effect on intended and actual condom use in adolescents. *Journal of Adolescent Health, 28*(5), 421–431.

Baltes, P. B., & Smith, J. (2008). The fascination of wisdom: Its nature, ontogeny, and function. *Perspectives on Psychological Science, 3*(1), 56-64.

Banach, S. J., & Ryan, A. (2009). The art of design: A design methodology. *Military Review, 89*(2), 105–111.

Bardzell, J., & Bardzell, S. (2013). What is critical about critical design? In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems: Changing Perspectives,* Paris (pp. 3297–3306). New York: ACM Press.

Bardzell, S., Bardzell, J., Forlizzi, J., Zimmerman, J., & Antanitis, J. (2012). Critical design and critical theory: The challenge of designing for provocation. In *Proceedings of the Designing Interactive Systems Conference: In The Wild,* New Castle (pp. 288–297). New York: ACM Press.

Bardzell, J., Bardzell, S., & Stolterman, E. (2014). Reading critical designs: Supporting reasoned interpretations of critical design. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems: One of a CHInd,* Toronto (pp. 1951–1960). New York: ACM Press.

Barki, H., & Hartwick, J. (2004). Conceptualizing the construct of interpersonal conflict. *International Journal of Conflict Management, 15*(3), 216–244.

Baumeister, R. F., & Heatherton, T. F. (1996). Self-regulation failure: An overview. *Psychological Inquiry, 7*(1), 1–15.

Bem, D. J. (1967). Self-perception: An alternative interpretation of cognitive dissonance phenomena. *Psychological Review, 74*(3), 183–200.

Benack, S., Basseches, M., & Swan, T. (1989). Dialectical thinking and adult creativity. In J. A. Glover, R. R. Ronning, and C. R. Reynolds (Eds.), *Handbook of Creativity* (pp. 199-208). New York, USA: Springer US.

Berlyne, D. E. (1960). *Conflict, Arousal and Curiosity.* New York: McGraw-Hill.

Bhamra, T., Lilley, D., & Tang, T. (2011). Design for sustainable behavior: using products to change consumer behavior. *The Design Journal, 14*(4), 427–445.

Bins, W. (2014). *Better Safe than Sorry! A Design Intervention that Triggers People to Reflect on Continuous Spatial Changes with an Emphasis on Local Wind-Farm Implementation.* Master thesis. Delft University of Technology, Delft, The Netherlands.

Brown, T. (2009). *Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation.* New York, NY: HarperCollins Publishers.

Brunstein, J. C. (1993). Personal goals and subjective well-being: A longitudinal study. *Journal of Personality and Social Psychology, 65*(5), 1061–1070.

Buijs, J. (2003). Modeling product innovation processes, from linear logic to circular chaos. *Creativity and Innovation Management, 12*(2), 76–93.

Chi, M. T. (2009). Active-constructive-interactive: A conceptual framework for differentiating learning activities. *Topics in Cognitive Science, 1*(1), 73–105.

Chulef, A. S., Read, S. J., & Walsh, D. A. (2001). A hierarchical taxonomy of human goals. *Motivation and Emotion, 25*(3), 191–232.

Coehoorn, M. (2014). *Phubbing? An Absurd Design Intervention for Redefining Smart-Phone Usage.* Master thesis. Delft University of Technology, Delft, The Netherlands.

Crilly, N., Good, D., Matravers, D., & Clarkson, P. J. (2008). Design as communication: exploring the validity and utility of relating intention to interpretation. *Design Studies, 29*(5), 425–457.

Cross, N. (2003). The expertise of exceptional designers. In N. Cross and E. Edmonds (Eds.), *Expertise in Design, Creativity and Cognition Press,* (pp. 23–35), Sydney: Sydney University of Technology.

Cross, N. (2004). Expertise in design: An overview. *Design Studies, 25*(5), 427–441.

Daalhuizen, J. (2014). *Method Usage in Design: How Methods Function as Mental Tools for Designers.* Unpublished doctoral dissertation. Delft University of Technology, Delft, The Netherlands.

Daalhuizen, J., Badke-Schaub, P., & Batill, S. M. (2009). Dealing with uncertainty in design practice: issues for designer-centered methodology. In M. Norell Bergendahl, M. Grimheden, L. Leifer, P. Skogstad, U. Lindemann (Eds.), DS 58-9: Proceedings of ICED 09, the *17th International Conference on Engineering Design,* Vol. 9, Human Behavior in Design. California, 24-27 August.

De Bono, E. (1995). Serious creativity. *The Journal for Quality and Participation, 18*(5), 12-18.

De Jong, P. L. C., & Özcan, E. (2016). Tolerance of ambiguity in relationship to creativity and its implications for design practice. In P. M. A. Desmet, S. F. Fokkinga, G. D. S. Ludden, N. Cila, and H. Van Zuthem (Eds.), *Celebration & Contemplation: Proceedings of the 10th International Conference on Design and Emotion,* Amsterdam, The Netherlands, 27-30 September.

Deci, E. L., & Ryan, R. M. (2008). Hedonia, eudaimonia, and well-being: An introduction. *Journal of Happiness Studies, 9*(1), 1–11.

Demir, E., Desmet, P. M. A., & Hekkert, P. (2009). Appraisal patterns of emotions in human-product interaction. *International Journal of Design, 3*(2), 41–51.

Desmet, P. M. A. (2002). *Designing Emotions.* Unpublished doctoral dissertation. Delft University of Technology, Delft, The Netherlands.

Desmet, P. M. A. (2004). From disgust to desire: How products elicit emotions. In D. C. McDonagh, P. Hekkert, J. van Erp, & D. Gyi (Eds.), *Design and Emotion: The Experience of Everyday Things* (pp. 8–12). London, UK: Taylor & Francis.

Desmet, P. M. A. (2008). Product emotion. In H. N. J. Schifferstein & P. Hekkert (Eds.), *Product Experience* (pp. 379-397). Amsterdam, The Netherlands: Elsevier.

Desmet, P. M. A. (2010). Three levels of product emotion. In C. Bouchard, A. Aussat, P. Levy, & T. Yamanaka (Eds.), *Proceedings of the International Conference on Kansei Engineering and Emotion Research* (pp.236–246). Paris: Arts et Métiers ParisTech.

Desmet, P. M. A. (2012). Faces of product pleasure: 25 positive emotions in human-product interactions. *International Journal of Design, 6*(2), 1-29.

Desmet, P. M. A., & Dijkhuis, E. A. (2003). Wheelchairs can be fun: A case of emotion-driven design. In *Proceedings of the International Conference on Designing Pleasurable Products and Interfaces* (pp. 22–27). New York, NY: ACM Press.

Desmet, P. M. A., & Pohlmeyer, A. E. (2013). Positive design: An introduction to design for subjective well-being. *International Journal of Design, 7*(3), 5–19.

DiSalvo, C. (2012). *Adversarial Design.* MIT Press.

Dorrestijn, S., & Verbeek, P. P. (2013). Technology, wellbeing, and freedom: The legacy of utopian design. *International Journal of Design, 7*(3), 45–56.

Dorst, K., & Cross, N. (2001). Creativity in the design process: Co-evolution of problem–solution. *Design Studies, 22*(5), 425–437.

Dunne, A., & Raby, F. (2013). *Speculative Everything: Design, Fiction, and Social Dreaming.* Cambridge, MA: MIT Press.

Ehrich, L. (1996). The difficulties of using phenomenology: A novice researcher's experience. In P. Willis and B. Neville (Eds.), *Qualitative Research Practice in Adult Education* (pp. 199–216). Ringwood, Victoria: David Lovell Publishing.

Eisenhardt, K. M. (1989). Building theories from case study research. *Academy of Management Review, 14*(4), 532–550.

Emmons, R. A., & King, L. A. (1988). Conflicts among personal strivings: Immediate and long-term implications for psychological and physical well-being. *Journal of Personality and Social Psychology,* 54(6), 1040–1048.

Englander, M. (2012). The Interview: Data Collection in Descriptive Phenomenological Human Scientific Research. *Journal of Phenomenological Psychology, 43*(1), 13–35.

Erikson, E. H. (1980). *Identity and the Life Cycle.* New York: WW Norton & Company.

Ferri, G., Bardzell, J., Bardzell, S., & Louraine, S. (2014). Analyzing critical designs: Categories, distinctions, and canons of exemplars. In *Proceedings of the 2014 conference on Designing interactive systems: Crafting Design,* Vancouver (pp. 355–364). ACM Press.

Festinger, L. (1957). *A Theory of Cognitive Dissonance.* Stanford, CA: Stanford University Press.

Fishbach, A., & Converse, B. A. (2011). Identifying and battling temptation. In K. D. Vohs and R. F. Baumeister (Eds.), *Handbook of Self-regulation: Research, Theory, and Applications* (pp. 244–260). New York: The Guilford Press.

Fishbach, A., & Zhang, Y. (2008). Together or apart: When goals and temptations complement versus compete. *Journal of Personality and Social Psychology, 94*(4), 547–559.

Fleming, S. (2014, January 8). "Hesitate! Indecisions is sometimes the best way to decide" *Aeon Magazine,* http://aeon.co/magazine/psychology/indecision-issometimes-the-best-way-to-decide/ (Last accessed 31 May, 2015).

Fogg, B. J. (2003). *Persuasive Technology: Using Computers to Change What We Think and Do.* Boston: Morgan Kaufmann Publishers.

Fokkinga, S. F. (2015). *Design-|+ Negative Emotions for Positive Experiences.* Unpublished doctoral dissertation. Delft University of Technology, Delft, The Netherlands.

Fokkinga, S., & Desmet, P. M. A. (2012). Meaningful mix or tricky conflict: A categorization of mixed emotions and their usefulness for design. In J. Brassett, P. Hekkert, G. Ludden, M. Malpass and J. McDonnell (Eds.), *Proceedings of the 8th International Conference on Design and Emotion,* London, 11-14 September.

Ford, M. E. (1992). *Motivating Humans: Goals, Emotions, and Personal Agency Beliefs.* Newbury Park, CA: Sage Publications.

Fosnot, C. T., & Perry, R. S. (1996). Constructivism: A psychological theory of learning. *Constructivism: Theory, Perspectives, and Practice,* 8–33.

Freud, S. (1929). *Civilization and Its Discontents.* London: Penguin Books.

Frijda, N. H. (1986). *The Emotions.* Cambridge, UK: Cambridge University Press.

Frijda, N. H. (1988). The laws of emotion. *American Psychologist, 43*(5), 349–358.

Frijda, N. H. (2007). The Laws of Emotions. Mahwah, NJ: Lawrence Erlbaum.

Frijda, N. H. (2010). Not passion's slave. *Emotion Review, 2*(1), 68–75.

Gaver, B., Dunne, T., & Pacenti, E. (1999). Design: Cultural probes. *Interactions, 6*(1), 21–29.

Gaver, W. W., Beaver, J., & Benford, S. (2003). Ambiguity as a resource for design. In *Proceedings of the SIGCHI conference on Human factors in computing systems: New Horizons,* Florida (pp. 233–240). New York: ACM Press.

Giner-Sorolla, R. (2001). Guilty pleasures and grim necessities: Affective attitudes in dilemmas of self-control. *Journal of Personality and Social Psychology, 80*(2), 206–221.

Harmon, E., & Mazmanian, M. (2013). Stories of the smartphone in everyday discourse: Conflict, tension and instability. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems: Changing Perspectives,* Paris (pp. 1051–1060) New York: ACM Press.

Hassenzahl, M., & Laschke, M., (2015). Pleasurable Troublemakers. In Steffen Walz and Sebastian Deterding (Eds.), *The Gameful World,* (pp. 167–195). Cambridge, MA: MIT Press.

Heape, C. R. A. (2002). *Designing Space.* Unpublished doctoral dissertation. University of Southern Denmark, Sønderborg, Denmark.

Hekkert, P., & van Dijk, M. (2011). *ViP-Vision in Design: A Guidebook for Innovators.* Amsterdam: BIS Publishers.

Hernandez, N. V., Shah, J. J., & Smith, S. M. (2010). Understanding design ideation mechanisms through multilevel aligned empirical studies. *Design Studies, 31*(4), 382–410.

Hofmann, W., Baumeister, R. F., Förster, G., & Vohs, K. D. (2012). Everyday temptations: An experience sampling study of desire, conflict, and self-control. *Journal of Personality and Social Psychology,* 102(6), 1318–1336.

Höök, K., & Löwgren, J. (2012). Strong concepts: Intermediate-level knowledge in interaction design research. *ACM Transactions on Computer-Human Interaction (TOCHI),* 19(3), 23–41.

Huta, V., & Ryan, R. M. (2010). Pursuing pleasure or virtue: The differential and overlapping well-being benefits of hedonic and eudaimonic motives. *Journal of Happiness Studies 11*(6), 735–762.

Hyvönen, K., Rantanen, J., Huhtala, M., Wiese, B. S., Tolvanen, A., & Feldt, T. (2015). Conflicting personal goals: a risk to occupational well-being? *Journal of Managerial Psychology, 30*(8), 1034–1048.

Innemee, J. (2014). *Uniekies Game: Changing a Child's Mindset towards Children with Disabilities.* Master thesis. Delft University of Technology, Delft, The Netherlands.

Jensen, T. E., & Andreasen, M. M. (2010). Design methods in practice: Beyond the systematic approach of Pahl and Beitz. In D. Marjanovic, M. Storga, N. Pavkovic, and N. Bojcetic (Eds.), *Proceedings of DESIGN 2010, the 11th International Design Conference,* Dubrovnik, Croatia, 16-19 May.

Jonassen, D. H. (1991). Objectivism vs. constructivism. *Educational Technology Research and Development, 39*(3), 5-14.

Jonassen, D. H. (1997). Instructional design models for well-structured and ill-structured problem-solving learning outcomes. *Educational Technology Research and Development, 45*(1), 65–94.

Jonassen, D. H. (2000). Toward a design theory of problem solving. *Educational Technology Research and Development, 48*(4), 63–85.

Jordan, P. W. (2000). *Designing Pleasurable Products.* Oxon, UK: Taylor & Francis.

Kleiman, T., & Hassin, R. R. (2011). Non-conscious goal conflicts. *Journal of Experimental Social Psychology, 47*(3), 521–532.

Laschke, M., Diefenbach, S., Schneider, T., & Hassenzahl, M. (2014). Keymoment: Initiating behavior change through friendly friction. In *Proceedings of the 8th Nordic Conference on Human-Computer Interaction: Fun, Fast, Foundational,* October 26–30, Helsinki, (pp. 853–858). New York: ACM Press.

Lazarus, R. S. (1991). *Emotion and Adaptation.* Oxford, UK: Oxford University Press.

Lewin, K. (1935). *A Dynamic Theory of Personality.* New York: McGraw-Hill.

Lloyd, P., & Van De Poel, I. (2008). Designing games to teach ethics. *Science and Engineering Ethics, 14*(3), 433–447.

Lockton, D., Harrison, D., & Stanton, N. A. (2010). The Design with Intent Method: A design tool for influencing user behavior. *Applied Ergonomics, 41*(3), 382–392.

Ludden, G., & de Ruijter, L. (2016). Supporting healthy behavior; A stages of change perspective on changing snacking habits of children. In *Proceedings of DRS 2016, Design Research Society 50th Anniversary Conference.* 27–30 June, Brighton, UK.

Malpass, M. (2013). Between Wit and reason: Defining associative, speculative, and critical design in practice. *Design and Culture, 5*(3), 333–356.

Malpass, M. (2015). Criticism and function in critical design practice. *Design Issues, 31*(2), 59–71.

Mann, D. (2001). TRIZ: The Theory of Inventive Problem Solving. *Creativity and Innovation Management, 10*(2), 123–125.

Manyiwa, S., & Crawford, I. (2002). Determining linkages between consumer choices in a social context and the consumer's values: A means–end approach. *Journal of Consumer Behavior, 2*(1), 54–70.

Margolin, V., & Margolin, S. (2002). A "social model" of design: Issues of practice and research. *Design Issues, 18*(4), 24–30.

Metcalfe, J., & Mischel, W. (1999). A hot/cool-system analysis of delay of gratification: Dynamics of willpower. *Psychological Review, 106*(1), 3–19.

Michalak, J., Heidenreich, T., & Hoyer, J. (2004). Goal conflicts: Concepts, findings, and consequences for psychotherapy. In W. M. Cox, & E. Klinger (Eds.), *Handbook of Motivational Counseling: Concepts, Approaches, and Assessment,* (pp. 83–98). NJ, USA: John Wiley & Sons.

Moehrle, M. G. (2005). What is TRIZ? From conceptual basics to a framework for research. *Creativity and Innovation Management, 14*(1), 3–13.

Moustakas, C. (1994). *Phenomenological Research Methods.* Thousand Oaks, CA, USA: Sage Publications.

Newby-Clark, I. R., McGregor, I., & Zanna, M. P. (2002). Thinking and caring about cognitive inconsistency: When and for whom does attitudinal ambivalence feel uncomfortable? *Journal of Personality and Social Psychology, 82*(2), 157–166.

Norman, D. A. (2004). *Emotional Design: Why We Love (or Hate) Everyday Things.* New York, NY: Basic Books.

Olson, J. M., & Zanna, M. P. (1993). Attitudes and attitude change. *Annual Review of Psychology, 44*(1), 117–154.

Ortony, A., Clore, G. L., & Collins, A. (1988). *The Cognitive Structure of Emotions.* Cambridge, UK: Cambridge University Press.

Özcan, E., & Sonneveld, M. (2009). Embodied explorations of sound and touch in conceptual design. In L. Chen, L. Feijs, M. Hessler, S. Kyffin, L. Pei-Ling, K. Overbeeke, and B. Young (Eds.), *Proceedings of Design and Semantics of Form and Movement DeSForM,* (pp. 173), Taipei, 26-27 October.

Ozkaramanli, D., & Desmet, P. M. A. (2012). I knew I shouldn't, yet I did it again! Emotion-driven design as a means to subjective well-being. *International Journal of Design, 6*(1), 27–39.

Ozkaramanli, D., & Desmet, P. M. A. (2016). Provocative design for unprovocative designers: Strategies for triggering personal dilemmas. In *Proceedings of DRS 2016, Design Research Society 50th Anniversary Conference.* Brighton, UK, 27-30 June.

Ozkaramanli, D., Desmet, P. M. A., & Özcan, E. (2016). Beyond resolving dilemmas: Three design directions for addressing intrapersonal concern conflicts. *Design Issues, 32*(3), 78–91.

Ozkaramanli, D., Fokkinga, S. F., Desmet, P. M. A., Balkan, E., & George, E. (2013). Recreating AlaTurca; consumer goal conflicts as a creative driver for innovation. In D.S. Fellows (Ed.), *Brilliant Transformations: Proceedings of Qualitative Research 2013, Valencia,* 17-19 November. Amsterdam (NL): ESOMAR.

Ozkaramanli, D., Özcan, E.; & Desmet, P. M. A. (2014). Capturing conflict experiences: Five methods for identifying intra-personal concern conflicts. In J. Salamanca, P. M. A. Desmet, A. Burbano, G. Ludden and J. Maya (Eds.), *The Colors of Care: Proceedings of the 9th International Conference on Design and Emotion,* Bogotá, Colombia, 6-10 October. Bogotá: Ediciones Uniandes.

Ozkaramanli, D., Özcan, E., & Desmet, P. M. A. (2017). Long-term goals or immediate desires? How to use self-Control dilemmas to design for distant gains. *The Design Journal, 20(*2), 219-238.

Perugini, M., & Bagozzi, R. P. (2001). The role of desires and anticipated emotions in goal-directed behaviors: Broadening and deepening the theory of planned behavior. *British Journal of Social Psychology, 40*(1), 79–98.

Piaget, J. (1952). *The Origins of Intelligence in Children.* New York: International Universities Press.

Pugmire, D. (1996). Conflicting emotions and the indivisible heart. *Philosophy, 71*(275), 27–40.

Reynolds, T. J., & Gutman, J. (1988). Laddering theory, method, analysis, and interpretation. *Journal of Advertising Research, 2,* 11–31.

Riediger, M., & Freund, A. M. (2004). Interference and facilitation among personal goals: Differential associations with subjective well-being and persistent goal pursuit. *Personality and Social Psychology Bulletin, 30*(12), 1511–1523.

Roozenburg, N. F., & Eekels, J. (1995). *Product Design: Fundamentals and Methods, (Vol. 2).* Chichester: Wiley.

Runco, M. A., & Acar, S. (2012). Divergent thinking as an indicator of creative potential. *Creativity Research Journal, 24*(1), 1–10.

Sanders, E. B. N., Brandt, E., & Binder, T. (2010). A framework for organizing the tools and techniques of participatory design. In *Proceedings of the 11th Biennial Participatory Design Conference: Participation :: Challenge,* Sydney, Australia, 29 November – 3 December, 2010 (pp. 195–198). ACM Press.

Schmuck, P., & Sheldon, K. M. (Eds.). (2001). *Life Goals and Well-being: Towards a Positive Psychology of Human Striving.* Seattle, WA: Hogrefe & Huber.

Schön, D. (1984). Problems, frames and perspectives on designing. *Design Studies, 5*(3), 132–136.

Schön, D. (1991). *The Reflective Practitioner: How Professionals Think in Action.* Basic Books.

Schwartz, B. (2004). *Paradox of Choice: Why More is Less.* New York, NY: HarperCollins Publishers.

Sengers, P., Boehner, K., David, S., & Kaye, J. J. (2005). Reflective design. In *Proceedings of the 4th Decennial Conference on Critical Computing: Between Sense and Sensibility,* Aarhus (pp. 49–58). New York: ACM Press.

Sengers, P., & Gaver, B. (2006). Staying open to interpretation: engaging multiple meanings in design and evaluation. In *Proceedings of the 6th Conference on Designing Interactive Systems* (pp. 99-108). June 26-28, University Park, PA, USA. ACM.

Shantz, C. U., & Hartup, W. W. (1995). *Conflict in Child and Adolescent Development.* Cambridge University Press.

Sheldon, K. M. (1995). Creativity and goal conflict. *Creativity Research Journal, 8*(3), 299–306.

Simon, H. A. (1969). *The Sciences of the Artificial.* Cambridge, MA.

Simon, H. A. (1973). The structure of ill structured problems. *Artificial Intelligence, 4*(3-4), 181–201.

Simon, H. A. (1996). *The Sciences of the Artificial.* MIT press.

Sirgy, M. J., & Wu, J. (2009). The pleasant life, the engaged life, and the meaningful life: What about the balanced life? *Journal of Happiness Studies, 10*(2), 183–196.

Sleeswijk-Visser, F., Stappers, P. J., van der Lugt, R., & Sanders, E. B. N. (2005). Contextmapping: Experiences from practice. *CoDesign, 1*(2), 119–149.

Strategy. 2016. In Merriam-Webster.com. Retrieved August 18, 2011, from http://www.merriam-webster.com/dictionary/strategy.

Strayhorn, J. M. (2002). Self-control: Theory and research. *Journal of the American Academy of Child & Adolescent Psychiatry, 41*(1), 7-16.

Thaler, R. H., & Sunstein, C. R. (2008). *Nudge: Improving Decisions about Health, Wealth, and Happiness.* New York: Penguin Books.

Tharp, B. M., & Tharp, S. M. (2013). Discursive design basics: Mode and audience. In *Proceedings of Nordic Design Research Conference: Experiments in Design Research,* Copenhagen (pp. 406–409).

Thomas, G. (2010). Doing case study: Abduction not induction, phronesis not theory. *Qualitative Inquiry, 16*(7), 575–582.

Thomas, G. (2011). A typology for the case study in social science following a review of definition, discourse, and structure. *Qualitative Inquiry, 17*(6), 511–521.

Tromp, N. (2013). *Social Design.* Unpublished doctoral dissertation. Delft University of Technology, Delft, The Netherlands.

Van Harreveld, F., Rutjens, B. T., Rotteveel, M., Nordgren, L. F., & Van Der Pligt, J. (2009). Ambivalence and decisional conflict as a cause of psychological discomfort: Feeling tense before jumping off the fence. *Journal of Experimental Social Psychology, 45*(1), 167-173.

Verganti, R. (2009). *Design-Driven Innovation: Changing the Rules of Competition by Radically Innovating What Things Mean.* Harvard Business Press.

Ward, T. B., Patterson, M. J., & Sifonis, C. M. (2004). The role of specificity and abstraction in creative idea generation. *Creativity Research Journal, 16*(1), 1–9.

Wiemer-Hastings, K., & Xu, X. (2005). Content differences for abstract and concrete concept. *Cognitive Science, 29*(5), 719–736.

Wilson, G. T., Bhamra, T., & Lilley, D. (2015). The considerations and limitations of feedback as a strategy for behavior change. *International Journal of Sustainable Engineering, 8*(3), 186–195.

Wilson, T. D. (2002). *Strangers to Ourselves: Discovering the Adaptive Unconscious.* Cambridge, MA: Harvard University Press.

Yin, R. K. (1984). The case study crisis: Some answers. *Administrative Science Quarterly, 26*(1), 58–65.

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ABOUT THE AUTHOR

Deger Ozkaramanli was born in Nicosia, Cyprus in 1984. She received her bachelor degree in Industrial Engineering from Louisiana State University (with honors) in 2005. She continued her education in Industrial Engineering with a concentration in physical ergonomics, and received her first MSc degree from University of Miami in 2007. In 2008, she moved to the Netherlands to study Design for Interaction at Delft University of Technology. As part of her studies, she followed the elective course on Design for Emotion and Subjective Wellbeing, and co-authored a conference paper about the content of this course together with Erdem Demir and Pieter Desmet. Inspired by the content of this elective course, she created a graduation assignment in which she could integrate designing for emotion with food design. Following her graduation from Delft University of Technology in 2010, she published a journal paper in International Journal of Design, which was co-authored by Pieter Desmet, discussing the main insights from her graduation project.

In 2011, Deger received a scholarship from the Ministry of Education in North Cyprus to partially fund her PhD project at the Department of Industrial Design at Delft University of Technology. Her PhD research focused on supporting designers in understanding and identifying personal dilemmas during user research and addressing these dilemmas in design ideation. Her PhD project is the first research project in the portfolio of Delft Institute of Positive Design, which was founded in 2010 with the aim to develop the knowledge and tools to support designers in designing for human flourishing.

Between 2011 and 2016, Deger published her research in leading design journals, such as Design Issues, International Journal of Design, and The Design Journal; presented her work at academic and non-academic venues, assisted master classes in emotion-driven design; organized workshops in dilemma-driven design; and taught in eight different master- and bachelor-level courses. In addition

to her research and teaching, she contributed to three large-scale innovation projects at a multi-national food company, in which she helped implementing a dilemma-driven consumer research approach. Combining her passion in food with her research on dilemmas, she also designed activities for events such as Discovery Festival 2010 (in collaboration with Beatrijs Voorneman) and Positive Design Symposium in 2013.

In 2016, Deger was offered a lecturer position in teaching and research at the University of Liverpool, where she currently works. She continues her research on dilemma-driven design and aims to ensure that her research and teaching remains relevant for design practice. She also dreams of opening her own food design studio in Cyprus, which she wants to name 'the fig tree'.

Publications

Ozkaramanli, D., Desmet, P. M. A., & Özcan, E. (In press). Is this a design-worthy dilemma? Identifying relevant and inspiring concern conflicts as input for user-centered design. *Journal of Design Research.*

Ozkaramanli, D., Özcan, E., & Desmet, P. M. A. (2017). Long-term goals or immediate desires? Introducing a toolset for designing with self-control dilemmas. *The Design Journal, 20*(2), 219-238.

Ozkaramanli, D., Desmet, P. M. A., & Özcan, E. (2016). Beyond Resolving Dilemmas: Three Design Directions for Addressing Intrapersonal Concern Conflicts. *Design Issues, 32*(3), 78-91.

Ozkaramanli, D., & Desmet, P. M. A. (2016). Provocative design for unprovocative designers: Strategies for triggering personal dilemmas. In *Proceedings of DRS 2016, Design Research Society 50th Anniversary Conference.* Brighton, 27-30 June.

Desmet, P. M. A., Fokkinga, S. F., Ozkaramanli, D., & Yoon, J. K. (2016). Emotion-driven design. In H. L. Meiselman (Ed.), *Emotion Measurement* (pp. 405-426). Woodhead Publishing.

Ozkaramanli, D., Özcan, E.; & Desmet, P. M. A. (2014). Capturing conflict experiences: Five methods for identifying intra-personal concern conflicts. In J. Salamanca, P. M. A. Desmet, A. Burbano, G. Ludden and J. Maya (Eds.), *The Colors of Care: Proceedings of the 9th International Conference on Design and Emotion,* Bogotá, Colombia, 6-10 October. Bogotá: Ediciones Uniandes.

Ozkaramanli, D., Özcan, E.; & Desmet, P. M. A. (2014). Language of Conflicts: An introduction to using concern conflicts as a design opportunity. In J. Salamanca, P. M. A. Desmet, A. Burbano, G. Ludden and J. Maya (Eds.), *The Colors of Care: Proceedings of the 9th International Conference on Design and Emotion,* Bogotá, Colombia, 6-10 October. Bogotá: Ediciones Uniandes.

Ozkaramanli, D., Fokkinga, S. F., Desmet, P. M. A., Balkan, E., & George, E. (2013). Recreating AlaTurca: Consumer goal conflicts as a creative driver for innovation. In D.S. Fellows (Ed.), *Brilliant Transformations: Proceedings of Qualitative Research,* Valencia, 17-19 November. Amsterdam (NL): ESOMAR.

Ozkaramanli, D., Desmet, P. M. A., Hekkert, P. (2012). Proud to be in control: Understanding concern conflicts and initial principles for conflict-inspired design approaches. In J. Brassett, P. Hekkert, G. Ludden, M. Malpass and J. McDonnell (Eds.), *Proceedings of the 8th International Conference on Design and Emotion,* London, 11-14 September.

Ozkaramanli, D., & Desmet, P. M. A. (2012). I knew I shouldn't yet I did it again! Emotion-driven design as a means to subjective well-being. *International Journal of Design, 6*(1), 27-39.

Demir, E., Ozkaramanli, D., & Desmet, P. M. A. (2010). How to Design for Emotions: Experiences in a Course. In: K. Sato, P. M. A. Desmet, P. Hekkert, G. Ludden, & A. Mathew (Eds.). In *Blatantly Blues: Proceedings of the 7th International Design & Emotion Conference 2010,* Chicago, 4-7 October.

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