STRATEGIES FOR DESIGN INTERVENTIONS THAT PROMOTE PROSOCIAL BEHAVIOR FOR LITTERING

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ABSTRACT

STRATEGIES FOR DESIGN INTERVENTIONS THAT PROMOTE PROSOCIAL BEHAVIOR FOR LITTERING

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Humanity is confronted with social problems such as pollution, resource depletion, obesity, global warming, etc. In order to overcome these problems, people should act for the benefit of the society. The field of industrial design has the potential to promote prosocial behavior as products are proved to be capable of influencing user behavior. Existing literature suggests methods and toolkits for behavior change through design. However, effectiveness of the strategies proposed with these toolkits and methods are not thoroughly examined from the user's perspective. This study explores how design interventions that promote prosocial behavior are perceived by the user, with the aim of discussing and proposing strategies for designing interventions to reduce littering behavior. For this purpose, interviews were conducted with users based on the personal construct theory. Nine existing products that are aimed to change littering behavior are evaluated by 15 participants using the triadic elicitation technique. Through examining the results of the interviews, the study revealed design related dimensions, grouped under three categories. The first group of dimensions were called 'fundamentals' which indicate imperative requirements for a product to have a persuasive impact. Secondly, the study revealed approaches that can be used for persuasion purposes called 'strategies'. Lastly, the study discovered sensitive issues that may affect users' perception and overall experience called 'considerations'. This thesis will serve as a guide for designers who are briefed with solving a social problem.

Keywords: behavior change, littering, persuasive design, prosocial behavior, social problems.

ÖZ

ÇÖP ATMAYA YÖNELİK TOPLUM YANLISI DAVRANIŞLARI TEŞVİK EDEN TASARIM MÜDAHALESİ STRATEJİLERİ

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İnsanlık kirlilik, kaynakların tükenmesi, obezite, küresel ısınma gibi toplumsal sorunlarla karşı karşıyadır. Bu sorunları aşmak için insanlar toplum yararına davranışları benimsemelidir. Ürünlerin kullanıcı davranışını etkileyebilmesi sayesinde, endüstriyel tasarım alanı insanlarda prososyal davranışları geliştirme potansiyeline sahiptir. Mevcut literatür, tasarım yoluyla insanların davranışlarını değiştirmek için yöntem ve araç setleri önermektedir. Öte yandan, prososyal davranışları teşvik etmek için tasarımcıların hangi ürün özelliklerini dikkate alması gerektiği literatürde vurgulanmamaktadır. Bu çalışma, çöp atma davranışını azaltmaya yönelik yapılacak tasarım müdahalelerini tartışmak ve tasarım stratejileri öne sürmek amacı ile prososyal davranışlara teşvik etmek için tasarlanmış tasarım müdahalelerinin kullanıcılar tarafından nasıl algılandığını araştırmaktadır. Bu amaçla, kişisel yapı teorisini temel alan mülakatlar yapılmıştır. Çöp atma davranışını azaltmaya yönelik mevcut dokuz tasarım müdahalesi 15 kullanıcı tarafından üçlü çıkarım (*triadic elicitation*) yöntemi kullanılarak değerlendirilmiştir. Mülakat sonucunda ortaya çıkan tasarım özellikleri üç başlık altında gruplandırılmıştır. Bu üç başlıktan ilki 'temel' özellikler olarak adlandırılmıştır ve bir tasarımın teşvik edici olması için zorunlu olan özellikleridir. İkinci başlık olan 'stratejiler' ikna edici tasarımda kullanılabilecek yaklaşımlardır. Son başlık olan 'göz önünde bulundurulması gerekenler' ise kullanıcının algısını ve deneyimini etkileyebilecek, tasarımcının dikkat etmesi gereken hassas konulardır. Bu çalışma, bir sosyal problemi çözmesi beklenen tasarımcılar için rehber görevi görecektir.

Anahtar kelimeler: davranış değişimi, çevreyi kirletme, ikna edici tasarım, prososyal davranış, sosyal problemler.

To Hande

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CHAPTER I

INTRODUCTION

1.1 Problem Definition

Humanity is confronted with major problems such as pollution, resource depletion, obesity, global warming. Although majority of people would agree on the severity of such problems, very few would actually react. People seem to perceive these problems as subjects of a distant future until they experience the negative consequences in their daily lives.

Lacking the concerns we see towards social problems is explained by putting forward the personal concerns, which is often found to be clashing with social ones. Individuals are often challenged with situations, which make them choose between what is good for them in the short term or what is good for the society in the long run. When so many people decide to act in favor of their own short term benefits, social problems become the consequences. Governments and policy makers address these issues through laws and legislations. However, it is equally important to change individuals' viewpoints as well. In this regard, designers may take responsibility for solving social problems by changing people's perspectives.

One of the social problems that we see often in our lives is littering. Litter poses a number of important social, environmental, and aesthetic problems (Hansmann & Scholz, 2003). From social perspective, littering causes safety and hygiene problems as it breeds rats, flies and mosquitos and spreads disease. It damages the environment and causes severe problems to animals, sometimes costing their lives. Litter such as discarded batteries, plastic pieces or other kind of chemical components are sources of contamination, which result in irreversible damage to nature. Aesthetically, litter

disfigures our surroundings causing a negative effect on our well-being. High amount of money and resources are spent each year for resolving the littering problem [1].

In order to reduce social problems like littering, people must act for the benefit of the society. In other words, people must behave prosocially. Prosocial behaviors are voluntary behaviors that are beneficial for others like helping, comforting, sharing, and cooperating (Batson & Powell, 2003) Design interventions have the ability to persuade users towards prosocial behaviors.

Intentionally or not, designers have been influencing people's behavior beliefs and aspirations (Lilley, Lofthouse, & Bhamra, 2005). Moreover, it is claimed that some of todays problems are augmented by designed products and services (Tromp & Hekkert, 2012) When you think about obesity, it gets harder to stay healthy and fit when you are being seduced by the convenience of cars, elevators and home-delivery pizza services. Yet, not so long ago, design community realized that this power of design can be used reversely, this time for fixing problems. Consequently, design researchers have started working on ways for intentionally changing people's behaviors for better causes. Inspired by psychology, they developed tools and frameworks to have a better understanding of what kind of social impacts can be created via designed artifacts (Forlizzi, 2008). Some designers have started to investigate ways of promoting sustainable living (Bhamra, Lilley, & Tang, 2011; Wever, van Kuijk, & Boks, 2008) others have focused on designing products for developing countries (Kandachar, Jongh, & Diehl, 2009) and some even worked on reducing crime (Press, Erol, Cooper, & Thomas, 2000).

Existing literature on design for behavior change has a particular focus on design strategies and tools such as The Behavior Wizard (Fogg & Hreha, 2010), Design with Intent Toolkit (Lockton, 2013) and Social Implication Design (Tromp &

[1] According to TÜİK, in 2014, 8.5 billion Turkish Liras were spent on waste services.

Hekkert, 2012). These studies offer designers various design strategies to be used for persuading users to change their behavior. In order to test the effectiveness of such strategies for littering behavior, there are some experimental studies that evaluate design interventions developed based on such strategies (Tromp, 2013; Wever, 2003). However, these experimental studies miss out on the user experience part and fall short to explain the underlying reasons for behavior change. Numerous factors may have an impact on the behavior. For example, was it the shape of the product that persuaded users or was it the color of it? Did users change their behavior because of the product sounds or did they just find the materials interesting? In order to unveil these factors, qualitative studies conducted with users are required. In addition, there are very few studies that discuss and evaluate the existing strategies. An overall examination is required to find out their strengths and weaknesses.

1.2 Aim and Objectives of the Study

This study aims to provide insights for designers in encouraging prosocial behavior through eliciting personal constructs regarding design interventions for littering.
In order to meet the aim of the study, the main research question that will be answered through this study is:

- What are the design related dimensions of encouraging prosocial behavior in littering?

Subquestions for answering the main question are:

- How should the design interventions be for encouraging prosocial behavior in littering?
- Which strategies can be used to persuade users towards prosocial behaviors?
- What are the strengths and weaknesses of design intervention strategies?

1.3 Structure of the Thesis

The thesis includes five chapters. Contents of these chapters are described below.

Chapter 1 explains the problem definition and underlines its relevance to the field of industrial design. Then, aim and objectives of the study are described along with research questions to be answered. Finally, the structure of the thesis is presented.

Chapter 2 presents the literature review on the topic and its theoretical background. It starts off with putting up major theories on influencing human behavior, derived from the psychology literature. Then, littering is described as a social problem and existing interventions on littering behavior are presented. Lastly, user centered frameworks for behavior change are explained, followed by tools and methods for behavior change found in literature.

Chapter 3 explains the methodology used for the data collection and analysis. Initially, it justifies the data collection method and presents its theoretical background. Then, it introduces the materials used for the interview. Following that, the procedure of each session is described. Then, sampling used for participant selection is given. Lastly, data analysis is described.

Chapter 4, presents the results of the study under three titles, based on the data analysis. In the title called "Fundamentals", product attributes that are found to be essential for a product are explained. Under the second title, "Strategies", the possible ways of persuading people are included. The third title called "Keep in Mind" describes possible consequences of implementing the suggested strategies. Lastly, the chapter concludes with the discussion of overall findings.

Chapter 5 concludes the thesis by summarizing the study and reflecting back on the research questions. In this final chapter, design implications of the research findings are written down, limitations of the current research are listed and research areas for further studies are recommended.

CHAPTER 2

LITERATURE REVIEW

This chapter presents an overview of the literature relevant to the current study. The chapter starts with explaining concepts and issues that define how individuals develop behaviors regarding social problems. Then prosocial behavior is presented as the targeted behavior type and background information along with relevant studies on littering behavior are reported as the social problem. Afterwards, the chapter introduces the literature findings on persuasion and how it is implemented in fields of technology and design. Finally, the chapter presents and discusses tools and methods for persuasive design and behavior change.

2.1 Social Problems and Human Behavior

Individuals possess personal concerns as well as collective concerns regarding social issues. Social problems arise due to the conflict between personal and collective concerns, and such conflicts are called *social dilemmas*. The balance between social and individual concerns is regulated by implicit guidelines called *social norms*. Social norms are key drivers for *prosocial behavior*, which are the overall actions that benefit a society.

In this section, the terms social dilemmas, social norms and prosocial behavior are introduced as important issues regarding how individuals develop behaviors towards social problems.

2.1.1 Social Dilemmas: Conflict between Personal and Collective Concerns

Most of the societal problems are associated with multiple actors whose choices affect both their own and others' well-being (Van Lange & Joireman, 2008). To

explain how these choices are made, *social dilemma theory* is introduced (Tromp, 2013; Van Lange & Joireman, 2008). The theory suggests that, social dilemmas occur when individual concerns are in conflict with collective concerns (Tromp & Hekkert, 2012). In such situations, a person is supposed to make a decision either in favor of his/her own interest or in favor of society. For instance, going to work by car is more comfortable, but taking the public transportation or going by bike is better for the environment; throwing a cigarette butt on the ground is convenient but keeping it for a trash bin is better for the visual aesthetics of your surroundings. Social problems arise when many people act in favor of their individual concerns.

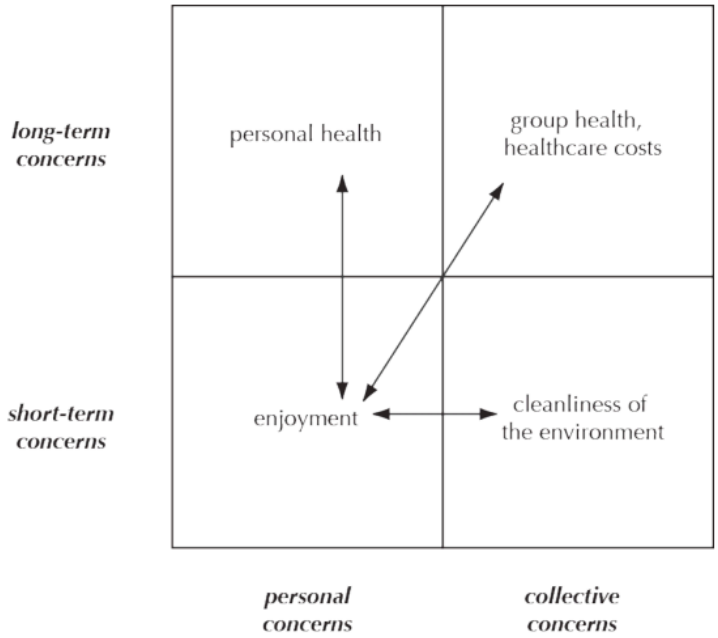

Figure 1. Temporal and social concerns in social dilemmas (Tromp, 2013)

Apart from individual or collective concerns, social dilemmas contain a temporal dimension as well (Van Lange & Joireman, 2008). A person may have short-term or long-term concerns. The social dilemma of smoking (Tromp, 2013) is a good example to illustrate both social and temporal concerns (Figure 1). In the short term, an individual would like to feel the enjoyment of smoking. However it contradicts with the cleanliness of the environment, which is collective concern. In the long

term, smoking causes personal health problems for the individual and increases group healthcare costs which negatively effects the whole community. Investigating relations between individual and collective concerns helps designers to choose better intervention strategies. Situations in which collective and personal concerns collide may require different interventions than situations that both concerns coincide (Tromp, Hekkert & Verbeek, 2011). If these two concerns collide, then forceful interventions are likely to be effective. However if they coincide, weak interventions will be sufficient [2]. It is also argued that products can persuade users towards collective concerns by addressing their personal concerns (Tromp et al., 2011).

In order to obtain a balance between personal and collective concerns, societies develop their own sets of social rules. These rules are called social norms which aim to manage egoistic impulses in favor of collective outcomes (Biel, Eek, & Gärling, 1999).

2.1.2 Social Norms and Norm Activation

Social norms are rules and standards that are recognized by members of a community that guide and/or constrain social behavior without laws (Cialdini & Trost, 1998) and they directly affect people's actions (Schultz, Nolan, Cialdini, Goldstein, & Griskevicius, 2007). Social norms emerge to regulate social life (Biel & Thøgersen, 2007) and they appear when individual actions cause negative side-effects for others (Coleman, 1990). Social norms are based on interactions with other people and are not always stated explicitly (Cialdini & Trost, 1998). Interventions that convey normative information are used for changing socially significant behaviors such as alcohol consumption, drug use, disordered eating, gambling, littering, and recycling. (Schultz et al., 2007) "In order to mobilize action against a social problem, public service communicators often include normative information in their persuasive appeals." (Cialdini et al., 2006)

[2] Forceful and weak interventions are explained in Section 2.2.3 Strategies for Behavior Change

Social norms fall under two categories: descriptive norms and injunctive norms, depending on the distinction between what other people do or what other people approve or disapprove (Cialdini, Reno & Kallgren, 1990). Descriptive norms are what people do, and they are considered as the typical or normal. Injunctive norms however, are what people approve or disapprove of in a given situation. Injunctive norms stimulate us to behave towards what community approves (Tromp, 2013) and they motivate action through the threat or promise of social sanction (de Kort, McCalley & Midden, 2008).

Apart from social norms, individuals have personal norms as well, that influence behavior strongly (Schwartz, 1977). Personal norms represent one's feelings of moral obligation towards taking action such as against nuclear energy or the intention to reduce one's use of cars (Gifford & Nilsson, 2014). Kallgren, Reno, & Cialdini (2000) tested the significance of personal norms in littering conditions. A questionnaire study revealed that participants with strong personal norms littered less.

While social norms motivate users through the possibility of social sanctions, personal norms drive users through actions tied to the self-concept like guilt or loss of self-esteem (de Kort et al., 2008). Therefore it is argued that social norms may have different effects if the behavior is visible to others (de Kort et al., 2008; P. W. Schultz, Bator, Large, Bruni, & Tabanico, 2011).

An important point to pay attention to is that norms should be activated to show an effect on behavior. Prior research shows that existence of social or personal norms are not solely enough for a behavior to occur. The focus theory of normative conduct suggested by Kallgren et al. (2000) reveals that a behavior happens only if the norm is salient (focal). In order to make a norm salient, that particular norm should be activated through attention-focus procedures. For instance, even though an individual possesses anti-littering norms, his/her attention should be focused on the norm to obtain a change in behavior. Norms can be activated using various methods. For

example, it was found that people who see another person litter in a clean environment litter less because they are focused on the littering behavior (R. B. Cialdini et al., 1990). Besides, people litter less if they read a diary passage related to anti-littering norm beforehand (Kallgren et al., 2000).

2.1.3 Prosocial behavior

Prosocial behavior is defined as any act that benefits another person or other people (Aronson, Wilson, & Akert, 2005). The term is an antonym of antisocial behavior and covers a broad range of actions such as helping, comforting, sharing, and cooperating (Batson & Powell, 2003).

One of the initial focus of behavior change studies was environmental behavior. Therefore, the literature on prosocial behavior often intersects with the term "pro-environmental behavior". "Pro-environmental behavior refers to behavior that harms the environment as little as possible, or even benefits the environment." (Steg & Vlek, 2009) Engaging in prosocial activities benefits others whereas, pro-environmental activities do not result in direct benefit to other individuals (Groot & Steg, 2009). Design researchers shifted their focus from pro-environmental behaviors to prosocial behaviors as well. (Lockton, Harrison, & Stanton, 2010)

2.2 Littering as a Social Problem

Litter is any piece of solid waste, ranging from small items like cigarette butts to as large items such as abandoned cars (Geller, Brasted, & Mann, 1979). Although littering of the environment can be caused by any misplaced object without human impact, research shows that a large majority of littering is done by individuals (MSW Consultants, 2009). Researchers have been looking for ways to decrease people's littering behavior (Schultz et al., 2011).

"From a social perspective, littering is considered as antisocial, unhealthy, and visually distasteful." (de Kort et al., 2008) It affects the environment negatively and

requires a considerable amount of funds for cleaning up. There are aesthetic issues with litter, as litter is visually disturbing.

Social problems are linked to each other. The level of littering in a community is an indicator changing crime rates (Brown, Perkins, & Brown, 2004), experimental studies show that the existence of litter causes an increase in social crimes such as theft (Keizer, Lindenberg, & Steg, 2008).

Research shows that cleanliness of the physical context is a determinant in littering behavior. Cialdini, Reno and Kallgren (1990) conducted an experiment in which they tucked handbills under the windshield wipers of parked cars and observed individuals littering behavior. They watched if people throw the handbill on the floor or not, in two different contexts; a clean environment as well as in a littered one. The study showed that people littered significantly more if the environment is already littered. Likewise, another study found that people are more likely to litter in "disordered" environments such as the ones covered with graffiti, already littered and with shopping carts left around (Keizer, Lindenberg, & Steg, 2008). Similarly, Schultz et al. (2011) also suggest keeping the context clean "beautification" as a strategy that will decrease littering behavior.

Distance from a receptacle is another determinant of littering behavior. If the trash bin is located far away from the user, then littering behavior increases. "One well-placed receptacle is likely to produce a larger reduction in littering than several inconveniently placed receptacles" (Schultz et al., 2011).

2.2.1 When to Intervene for Litter Reduction?

Strategies aimed for anti-littering behavior are grouped under two categories depending on when they occur; *antecedent* and *consequence* strategies (Wever, 2003). Antecedent strategies are applied before the act of littering. They aim to prevent the occurrence of littering behavior before it happens. Amount of existing litter in an environment; number, design and placement of trash receptacles and

different communication methods are considered as antecedent strategies. Communication methods can be implicit or explicit anti-littering messages, public campaigns or educational programs. On the other hand, consequence strategies are implemented after littering behavior happens. This kind of strategies aim to prevent future occurrences through rewards or punishment. According to de Kort et al. (2008) antecedent strategies are more cost-effective than consequence strategies.

2.2.2 Studies Regarding Interventions on Littering Behavior

Literature shows that researchers from various fields conducted empirical studies that address the problem of littering. Some of these studies have altered trash bins to change user behavior. Another group investigated the effects of external messages. Lastly, some researchers focused on the litter itself. Existing intervention studies are reported under three categories based on their focus: (i) trash bins, (ii) external messages, (iii) trash itself.

2.2.2.1 Studies that Focus on Trash Bins

Trash bins are often simple containers that temporarily store litter. However studies show that well designed trash bins can be more effective compared to conventional ones.

Geller et al. (1979) tested out obtrusive trash bin designs in an indoor shopping mall. Trash bins used for the research were “beautified” in the shape of birds and antilitter prompts were printed on them. After eight weeks of observation, the researched showed that the obtrusive trash bin design attracted more litter than conventional trash bins and less litter was observed in the vicinity of obtrusive trash bin designs.

Tromp (2013) has tested out four different trash bin designs at a university cafeteria (Figure 2). The aim of the study was to find out whether implicit or explicit product influence is more effective. For this purpose two trash bin designs (explicit and implicit) and two poster designs (explicit and implicit) are used. For the explicit

product, a screen is attached above the trash bin. Whenever someone throws a piece of trash, a sensor detects the movement and randomly displays a funny, rewarding or philosophical quote. For the implicit trash bin, lines were drawn from lunch tables, which converge near a trash bin. The idea behind it is that people would follow those lines with their eyes to the trash bin, which would remind them to throw away their trash when they are done with eating. Both implicit and explicit posters were hung on the trash bins. The explicit poster had a text on it, saying “Please throw away your garbage in the bin.” and the implicit poster saying: “Together we turn it into something beautiful.” All design interventions were observed in real context for five days and the amount of litter for each condition was counted.

Figure 2. Four design interventions from Tromp's (2013) study (p. 156).

The research showed that explicit influence is more effective in posters and implicit influence is more effective in product designs. Although significant difference between explicit and implicit types of influence was observed, none of the four interventions were statistically more efficient than a normal trash bin.

In their work, de Kort et al. (2008) tested persuasive trash bin designs for different kinds of norm activations. Trash bin designs were used for activating anti-littering norms both explicitly and implicitly. Explicit activation was achieved through a sign with an anti-littering message placed above the trash bin. Implicit activation

however, was carried out by attaching a mirror[3] above the trash bin instead of the sign. Field experiment showed that, implicit activation through design was as effective as the explicit activation through wording. This study claims that products can alter human behavior by activating specific norms.

2.2.2.2 Studies that Focus on External Messages

Prompting people through anti-litter messages is a way to decrease littering behavior. Research shows that different types of messages trigger different kinds of behavior. Reich & Robertson (1979) conducted a field experiment in a public swimming pool. People received handbills with various anti-litter messages. Research showed that normative commands that generated external pressure backfired. More litter was observed with messages like "Don't litter" or "Don't you dare litter". On the other hand, texts addressing internal normative standards such as "Help keep your pool clean" or "Keeping the pool clean depends on you," proved to be effective in reducing littering.

A study that aims to reduce littering in cinemas showed similar results with the previous study (Hansmann & Scholz, 2003). Before each movie session a text message was presented to audience for motivating anti-littering behavior. The results showed that triggering injunctive norms in a polite way, in this case thanking audience for not littering, resulted in reduction of littering behavior. Furthermore, they found that such prompts are more effective when the desired behavior is communicated in a specific way.

It is also suggested that anti-littering messages should emphasize that only a few individuals in a society litter and the rest of the community disapprove of them (Schultz et al., 2011).

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[3] The logic behind placing a mirror is that individuals who see themselves experience an increase in self-awareness, causing them to focus on their inner-states (Carver & Scheier, 1978). A similar way of personal norm activation was also used by Kallgren et al. (2000) using a close circuit TV.

2.2.2.3 A Study that Focuses on Trash

Besides the person who litter and the trash bin, the trash itself is also a factor in littering behavior. Wever (2003) used anti-littering messages on coffee cups (Figure 3) to reduce littering in a university cafeteria. The messages inform people about the negative consequences of littering behavior on the environment in a similar sense of Lilley's (2009a) eco-feedback. Although Wever's study resulted with a decrease in littering behavior, she reports a lack of memory effect. Littering rate went back to its previous state a week after the intervention stopped.

Figure 3. Coffee cup used in Wever's study (2003, p. 242)

2.3 Persuasive Design and Behavior Change

2.3.1 Major Theories on Persuasion

Although behavior change is a relatively new topic for design domain, it has been studied a lot in psychology. Researchers continuously adopt behavioral theories to the field of persuasive design (Consolvo, McDonald, & Landay, 2009; Zachrisson & Boks, 2012). This section aims to introduce major theories from the psychology literature that formed the foundations of persuasive design. Four major theories were illustrated which were often cited by design researchers.

2.3.1.1 Interpersonal Influence

Psychological principles that make people comply with a request are revealed by the work of Cialdini (1993). In his work called 'Weapons of Influence' (Cialdini, 1993), he explains how to gain compliance by targeting the "short-cuts" that people create for easy decision making. He suggests six principles: reciprocation, commitments and consistency, social proof, liking, authority and scarcity. These principles are described below:

- **Reciprocation:** People feel indebted to others who give something to them or do something for them. Reciprocation principle suggests that acting proactively and giving something to others will most likely motivate them to do something in return.
- **Commitment and Consistency:** People tend to stick with their commitments and stay consistent with their previous statements. They follow their existing attitudes, values and actions.
- **Social Proof:** People are inclined to do what others are doing especially when they are not sure. They are persuaded easier if they know that people like them also do the desired action.
- **Liking**: People tend to comply with others who make them feel good. Besides, people also approach positively to others who are similar to them in a way.
- **Authority:** People respect authority and they are persuaded easier by experts.
- **Scarcity:** Things seem more valuable to people if they become less available. People would like to obtain rare and uncommon things.

His work on persuasion inspired researchers like Fogg (2009) and inspired the strategies of persuasive technology (Tromp, 2013).

2.3.1.2 The Norm Activation Model

The Norm Activation Model (Schwartz, 1977) is a commonly used theory for understanding and persuading prosocial behaviors. The model takes personal norms as the driver for behavior which is triggered by two other variables; *awareness of consequences* and *ascription of responsibility* (Figure 4).

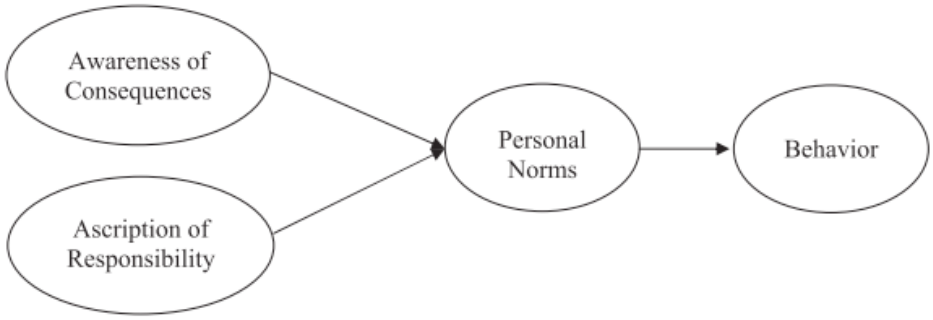

Figure 4. Norm Activation Model, Schwartz (1977).

Awareness of consequences stands for the situation, in which a person is aware of the negative consequences of not complying with social norms. Awareness, in this context, depends on whether an individual relates his/her own behavior to the welfare of others or not (Park & Ha, 2014). In most cases people relate their behavior to economic prosperity, but they do not grasp the impact of their behavior to environmental or social impacts at a wider scale (Lilley et al., 2005).

Ascription of responsibility on the other hand, is the feeling of responsibility for the negative consequences of not complying with social norms (Groot & Steg, 2009). Some scholars argue that ascription of responsibility is a moderator link between personal norms and behavior (Osterhus, 1997; Schwartz & Howard, 1980 as in Park & Ha, 2014); whereas, other scholars report that it is the best predictor of behavior (Liere & Dunlap, 1978).

2.3.1.3 The Theory of Planned Behavior

The Theory of Planned Behavior (Ajzen, 1991) concentrates on the individual's intention to form an action. Intentions indicate how hard people are willing to try in order to perform a behavior (Ajzen, 1991). The theory suggests three factors that lead to behavioral intentions: (i) attitude toward the behavior, (ii) subjective norm and (iii) perceived behavioral control (Figure 5).

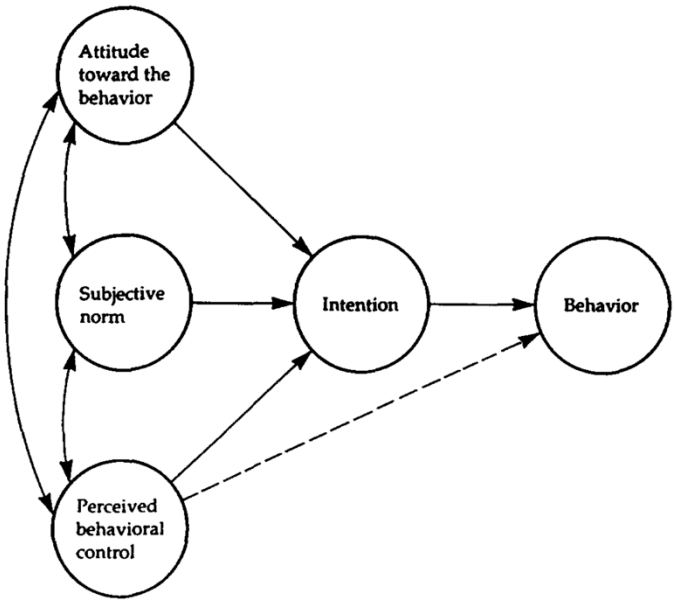

Figure 5. The Theory of Planned Behavior (Ajzen, 1991, p. 182)

Attitude toward the behavior signifies an individual's overall assessment of executing a behavior, and subjective norms stand for his/her view on other people's expectations regarding the behavior (Park & Ha, 2014). Perceived behavioral control refers to people's perception of how easy or difficult the behavior is (Ajzen, 1991)

2.3.1.4 Affordances and Constraints

The theory of affordances was first put forward by psychologist Gibson (1979) to initially understand what environment offers to animals. "Affordances are the actions permitted an animal by environmental objects, events, places, surfaces, people, and

so forth." (Michaels, 2003 p. 146) Later on, Norman (1988) brought the term into the field of design. In Norman's terms; "an affordance is a relationship between the properties of an object and the capabilities of the agent that determine just how the object could possibly be used" (Norman, 1988, p. 11). A handle on a door affords pulling, a chair affords sitting, a driving wheel affords turning etc.

Norman (1988) puts an emphasis on the notion that, an affordance is not a property but a relationship. It is jointly dependent on both the object and the user's abilities. Therefore, affordances can be subjective (Tromp, 2013). Affordances are also related to users' perception (Norman, 2004). A chair can be lifted by the majority of the people, however for young or relatively weaker people the chair does not afford lifting.

Apart from affordances, constraints also signify how a product is intended to be used. Constraints can force desired functions (Norman, 1988). Affordances and constraints can be used to motivate individuals to adopt more sustainable use habits or reform existing unsustainable habits (Bhamra et al., 2011). A product's functionality can be limited to desired actions only (Wever et al., 2008) Design practitioners strategically use affordances and constraints to influence user behavior such as reducing vehicle misfuelling or preventing homeless from sleeping on benches (Lockton, 2013).

"Norman describes these two factors as 'affordances' and 'constraints', affordances inform the user how the product could be used, constraints place limitations on what actions can be performed" (Crilly et al., 2004).

2.2.2 Persuasive Technology

Fogg (2003) introduced the term *captology*, also known as *persuasive technology*. Persuasive technology focuses on changing people's attitudes and behavior through the use of interactive technology (Fogg, Cuellar & Danielson, 2009). According to Fogg (2003), persuasion does not use force, it is done intentionally and it aims to

change people's attitude, behavior, or both. Although his work was mostly focused on using computers for persuasion purposes, design researchers quickly adopted the term.

Fogg Behavior Model (FBM) aims to explain the human behavior. The model (Fogg, 2009) has three main factors and subcomponents related to each of these factors. Three main factors are motivation, ability and triggers. In this model, user should feel motivated to perform an action, have the ability to do so and should be reminded for this action externally. According to the model, a behavior presents itself only if all of three factors are present at the same time supported with the example below:

> *I like practicing the ukulele, and it's easy to do. I have sufficient motivation and ability. What's missing is a well-timed trigger. I lack something that says, "Hey, right now is a great time to play the ukulele!" Without this trigger in my life, I don't do this target behavior each day each day"* (Fogg, 2009, pg.3) .

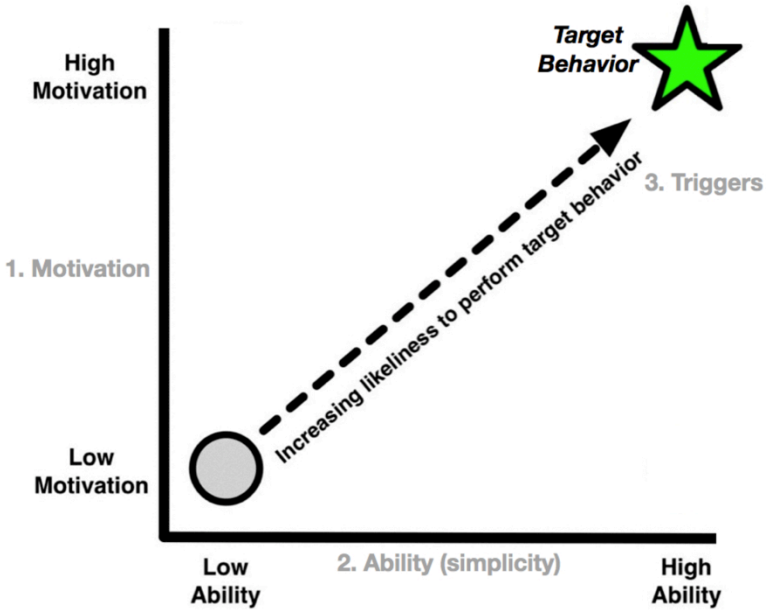

Figure 6. Behavior Model (Fogg, 2009, p. 2)

In the graphical representation of the model, there are two axes that represent motivation and ability (Figure 6). As the ability and motivation increase, the user becomes more likely to perform the target behavior. The star represe2nts the target behavior. The third factor, “triggers”, is positioned close to the target behavior, as a reminder that triggers need to be present for a behavior to happen.

The method includes the concept of behavior activation but it is not implemented to the visual representation. There is an imaginary threshold curve on the graph. If a person’s motivation and ability ends up above the curve, then a trigger make the behavior happen. If it is below the curve, then the trigger will simply be ineffective.

Besides encouraging users to perform a behavior, the FBM model gives insights on how to stop a behavior as well. In doing so, it assumes that all three factors are present at the time when the behavior occurs. From this point of view, lowering the ability or motivation, or taking away the trigger is going to prevent that behavior from happening.

The FBM is particularly useful for assessing existing designs. Fogg (2003) suggests that designers can improve their existing products/services by determining the missing factor in their design.

2.2.3 Strategies for Behavior Change

Some authors put forward design strategies to affect user behavior (Jelsma & Knot, 2002; Lilley, 2009; Lilley et al., 2005; Tromp et al., 2011; Wever et al., 2008; Zachrisson & Boks, 2010). They strive to identify factors that will aid designers to persuade people through products, services or environments. An overview of the literature on these frameworks and strategies they include are presented in Table 1.

Table 1. An overview of the strategies for behavior change in the literature

<table>
<tr><th>Jelsma, 1977</th><th>Lilley et al., 2005</th><th>Wever et al. 2008</th><th>Bhamra et al. 2008</th><th>Tromp et al. 2011</th><th>Zachrisson 2010</th></tr>
<tr><td rowspan="3"></td><td rowspan="3">Eco-feedback</td><td rowspan="3">Eco-feedback</td><td>Eco-information</td><td rowspan="5">Persuasive</td><td rowspan="3">Informing</td></tr>
<tr><td>Eco-feedback</td></tr>
<tr><td>Eco-spur</td></tr>
<tr><td rowspan="2">Scripts</td><td rowspan="2">Scripts and Behavior Steering</td><td rowspan="2">Scripts and Behavior Steering</td><td>Eco-choice</td><td rowspan="2">Persuading</td></tr>
<tr><td>Eco-steer</td></tr>
<tr><td rowspan="2"></td><td rowspan="2">Intelligent Products and Systems</td><td rowspan="2">Forced functionality</td><td>Eco-technical intervention</td><td rowspan="2">Decisive</td><td rowspan="2">Determining</td></tr>
<tr><td>Clever design</td></tr>
</table>

2.3.3.1 Design for Sustainable Behavior

Lilley et al. (2005) suggest *scripts and behavior steering, eco-feedback,* and *intelligent products-systems* as potential strategies for changing users' behaviors which are called *product led interventions* (Figure 7). Scripts and behavior steering uses the product layout such as shape mechanism or signals to guide user behavior towards the usage scenario intended by the designer (Jelsma & Knot, 2002). The product forces the user towards certain actions and constrains in others (Jelsma & Knot, 2002). For example, caps of PET bottles contain a script that motivates users to re-screw it back to the bottle (Wever et al., 2008). Research shows that compared to tear-off type of juice packages, PET bottles were littered less (Wever, 2003). This was due to the fact that the script suggested a second use for the bottle and users retained the bottles to fill it with tap water for later use.

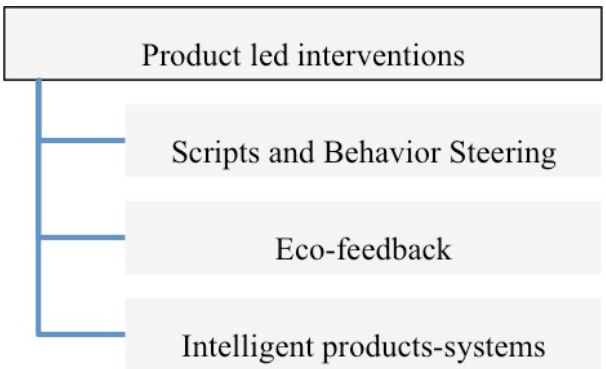

Figure 7. Product led interventions

Eco-feedback is based on giving users information about the impact of their behavior. It is suggested that giving feedback to users about the consequences of their actions would steer them to act in desirable ways. Although the term "feedback" suggests that the user must initiate an action to receive feedback the term isalso used for informative messages found on product packages for preventing littering (Wever, 2003).

In intelligent products and systems, the responsibility of the user is transferred to the product itself. Automatic systems take over the decision-making and automatically respond to situations in the desired way. The start-stop technology of modern cars can be given as an example. The car stops the engine whenever possible to reduce the fuel consumption without the user interfering (Lilley et al., 2005).

Three strategies mentioned above can be clarified with an example of washing detergents suggested by Lilley et al. (2005). The eco-feedback can be executed with written instructions on the packaging about the ideal amount of detergent to use for average washing machines. The script approach can make detergents in a tablet form containing the ideal amount. Lastly, the intelligent product-systems approach can be achieved with a washing machine that adds detergent automatically.

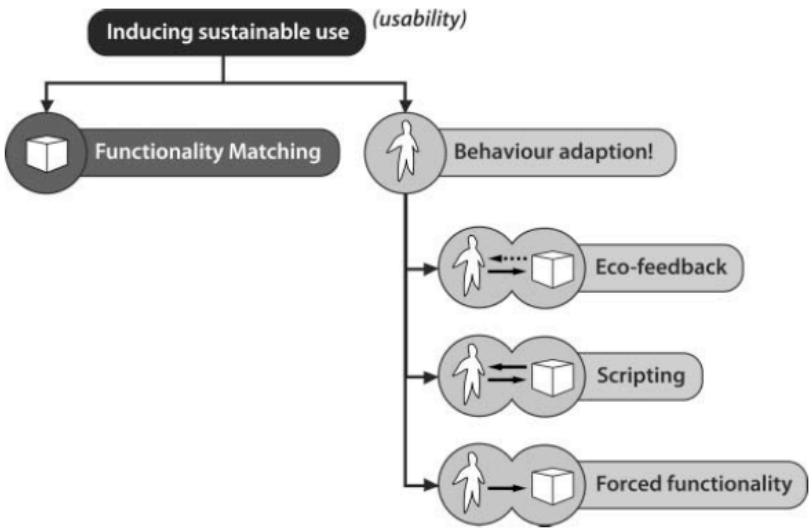

Figure 8. Sustainable behaviour-inducing design strategies (Wever et al. 2008, p. 14)

Building up on Lilley's suggested strategies, Wever et al. (2008) came up with a model to induce sustainable use (Figure 8). They added *functionality matching,* which suggests coherence between delivered functionalities and desired behaviors. A research on the placement of garbage bins in a park is a good example for functionality matching (Kwok 2006, in Wever et al., 2008). It was observed that the

people tend to bring their litter to the closest bin and in case the bin is full, they leave their litter by that bin despite the fact that there is another bin as close as 5 meters away. Therefore, increasing the capacity of frequently used garbage bins was suggested rather than increasing the number of bins which helps users to perform the desired behavior. Wever et al. (2008) also replaced the intelligent systems in Lilley's model, with forced functionality, which covers a broader spectrum of interventions.

2.3.3.2 Distribution of Control

In order to have a better understanding about when to use what type of behavior change strategy, Zachrisson & Boks (2010) suggested a model called "distribution of control". The model is a linear spectrum of design strategies that are placed according to how much control the user has over the intended behavior (Figure 9).

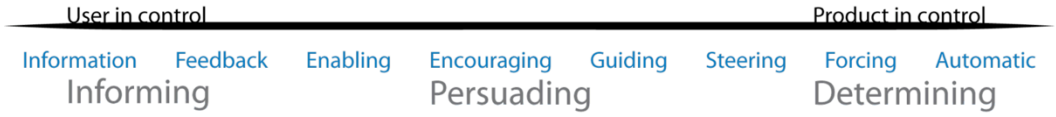

Figure 9. Distribution of Control (Zachrisson & Boks, 2010)

On one end of the spectrum, the user is in control and design strategies revolve around giving user information and feedback. At this side of the spectrum, the user has to perceive, interpret, understand and make sense out of that input before any kind of behavior change happens. At the opposite end, the product is in control thus, design interventions either force the user to act in a certain way or simply function automatically without giving the user much initiative. At the middle part however, the product persuades the user through strategies such as enabling, encouraging, guiding and steering.

The model is also linked with the amount of attention and reasoning demanded by the user. The more control a user has, the more attention and reasoning is demanded

by the product/intervention. If the product is in complete control, then no attention is required from the user. As a product can and should draw only the necessary amount of attention, the model is particularly useful to determine design strategies depending on the context of a product. For instance, if somebody is driving while using a product, that person can only spare a limited amount of his/her attention for the situation. That being the case, only the appropriate design strategies can be applied from the spectrum.

2.3.3.3 Categorization of Product Influence Based on User Experience

So far, design strategies focused on how to influence users. However, there is little knowledge on how users perceive interventions targeted to change their behavior.

Tromp et al. (2011) elaborate on how users experience design interventions based on two dimensions *force* and *salience*. In this context, force stands for how strong a user experiences an intervention. Products and services can influence users in various levels of force, ranging from 'strong' to 'weak'. For instance, if the target behavior is responsible driving, then speed bumps or speed limit cameras are stronger interventions than campaigns or road signs that calls drivers to slow down. Similar approaches to dimension of force can be found in other frameworks such as distribution of control suggested by Zachrisson & Boks (2010). The second dimension of the categorization is salience, which refers to the awareness level of the user about being persuaded. The salience of product influence ranges from 'apparent' to 'hidden'. For example, when briefed with increasing social relations within a company, organizing happy-friday parties is an apparent intervention, while placing a coffee machine at the hallway to support social interaction is much more hidden.

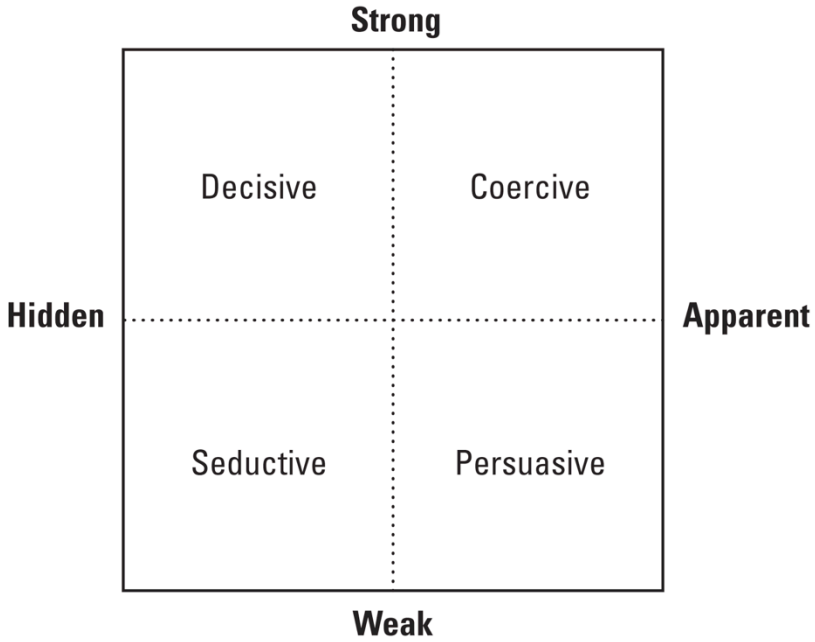

Figure 10. Categorization of product influence (Tromp et al. 2011, p. 12)

Based on the aforementioned dimensions product influence is categorized under four categories; coercive, persuasive, seductive, and decisive (Figure 10). Coercive influence is strong and apparent. It is often restricting and requires an authority for its execution. Sanctions such as punishment or social pressure are drivers for this kind of influence. Therefore, it fosters external motivation. Decisive influence is experienced strong as well but it is hidden. For this type of influence a product is designed in such a way that it only makes the desired behavior possible (this notion is similar to Wever et al.'s (2008) 'forced functionality'). Decisive influence can be seen in architectural decisions as walls and doors restrict and determine how we move. Persuasive influence is apparent and weak. This type of influence can be found in public campaigns. It is most effective when individual and personal concerns are matched. Lastly, seductive influence is both weak and hidden. People who are being seduced are not aware of being influenced and they experience an internal motivation.

Because this classification of product influence is based on user experience, a product cannot be appointed to a category permanently (Tromp et al., 2011). According to Tromp et al. (2011), different users may experience a product experience differently based on various factors like their personal norms, their view on the subject, time of the day, etc. For example, an individual may experience traffic lights as coercive when in a hurry but persuasive in a normal time.

2.2.5 Tools and Methods for Behavior Change

In this section major tools and methods that are proposed for behavior change are presented. Unlike the strategies presented in the previous section, tools and methods make a direct contribution to the design process. They aim alleviate to the process by providing useful insights or offering alternative perspectives.

2.3.4.1 Behavior Wizard

Fogg (2009) proposes a method called behavior wizard for guiding designers towards solutions to change people's behavior. Unlike Fogg's Behavior Model, the Behavior Wizard Method is outcome based and it aims to match target behaviors with design solutions. It is a refined version of his previous work called "The Behavior Grid" (Fogg, 2009).

	Green behavior Do new behavior, one that is unfamiliar	**Blue** behavior Do familiar behavior	**Purple** behavior Increase behavior intensity or duration	**Gray** behavior Decrease behavior intensity or duration	**Black** behavior Stop doing a behavior
Dot behavior is done one-time	**GreenDot** Do new behavior one time *Install solar panels on house*	**BlueDot** Do familiar behavior one time *Tell a friend about eco-friendly soap*	**PurpleDot** Increase behavior one time *Plant more trees & local plants today*	**GrayDot** Decrease behavior one time *Buy fewer bottles of water now*	**BlackDot** Stop doing a behavior one time *Turn off space heater for tonight*
Span behavior has specific duration, such as 40 days	**GreenSpan** Do new behavior for a period of time *Carpool to work for three weeks*	**BlueSpan** Do familiar behavior for a period of time *Bike to work for two months*	**PurpleSpan** Increase behavior for a period of time *Take public bus for one month*	**GraySpan** Decrease behavior for a period of time *Take shorter showers this week*	**BlackSpan** Stop a behavior for a period of time *Don't water lawn during summer*
Path behavior is done from now on, a permanent change	**GreenPath** Do new behavior from now on *Start growing own vegetables*	**BluePath** Do familiar behavior from now on *Turn off lights when leaving room*	**PurplePath** Increase behavior from now on *Purchase more local produce*	**GrayPath** Decrease behavior from now on *Eat less meat from now on*	**BlackPath** Stop a behavior from now on *Never litter again*

Figure 11. Behavior wizard (Fogg, 2009, p. 119)

The method is based on a grid (Figure 11) On the horizontal axis, there are five dimensions called "Flavors". Flavors are represented by various colors; green is doing a new and unfamiliar behavior, blue is doing a familiar behavior, purple is increasing a behavior, gray is decreasing a behavior and black is stopping a behavior. On the vertical axis, there are three dimensions called as "Durations". Durations are called dot, span and path. Dot is performing a behavior for one time, span is doing a behavior for a specific duration and path is making a permanent change. Intersections of the flavors and the durations illustrate different types of target behaviors. Therefore, target behaviors are labeled in abstract names such as "Black Dot", "Grey Path", etc...

The initial step of the method is to choose and clarify one of the 15 target behaviors. The next step is to identify how the target behavior is triggered (see section 2.2.2 for Fogg's (2009) take on triggers). The last step is to highlight concepts and solutions related to target behavior. At this point, the method offers a "Resource guide". The resource guide is a compilation of existing studies from the persuasion literature,

arranged for each type of behavior. So, if someone is aiming to achieve a "Gray Span" behavior, he/she can take a look at the resource guide to get inspired from existing work. As the knowledge on the field expands, the resource guide gets updated. The most recent version can be followed at the website www.BehaviorWizard.org.

2.3.4.2 Design with Intent Method

Design with Intent Method, developed by Lockton (2013) is a set of cards, aiming to guide product and system designers for influencing user behavior. The method compiles and connects different behavior change literature from different domains and creates a common tool for all designers to use.

Figure 12. Reciprocation card from DWI toolkit (Lockton, 2013)

On each card, there are provocative questions to make designers think on a subject and bring a different perspective to the table. An example would be; "Can you make users feel they've been done a favor (by the system, or by other users) and want to return it?" Here in Figure 12, the question on the card invites the designer to implement reciprocation to his/her design.

2.3.4.3 Social Implication Design

In most of the products and services, the product domain is pre-determined and the persuasiveness aspect comes into play as an "add-on" to an existing object. For example, when the designers intention is to reduce the frequency of people forgetting their debit cards in ATMs (Lockton, 2013), the solution space does not go far beyond from the card reader or the machine itself. However, situations in which the kind of product to design is not clear the existing methods are insufficient (Tromp & Hekkert, 2012).

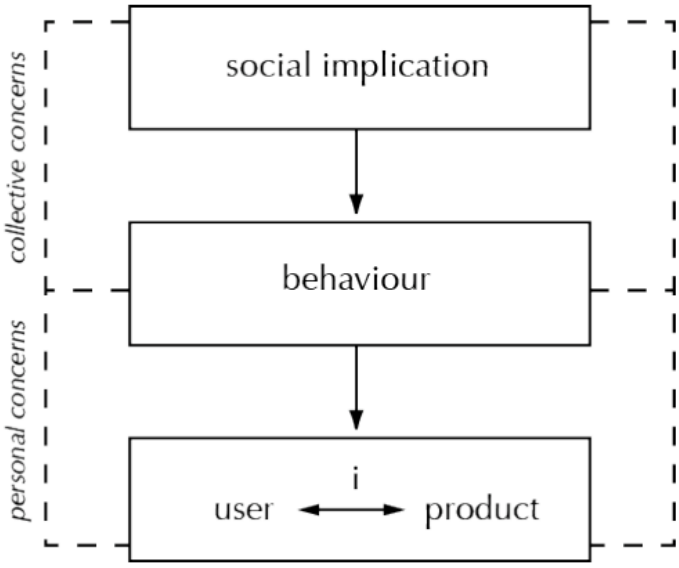

Figure 13. Social implicaton design model (Tromp & Hekkert, 2012, p. 5)

Social implication design looks at the persuasive design topic from a wider perspective (Figure 13). The method starts from a desired side effect (Tromp & Hekkert, 2012) and takes it as a diverging point for design explorations. Unlike other methods, the design remains as a "black box" for a while during the design process and the designer focuses on the relational qualities of the design (Tromp & Hekkert, 2012).

The roots of SiD method can be found in the Vision in Product design method founded by (Hekkert, Dijk & Lloyd, 2011). The main element of the ViP method is an “interaction vision”. Interaction vision is a statement that expresses the effects of intended user interaction. An interaction vision can be “The excitement that a person feels when he/she rides a bicycle for the first time.” Starting from such a statement, the designer starts to look for design solutions that lead users to a similar experience.

The literature research revealed important points about the research problem. Firstly, the widespread notion of social problems is explained. Then, the littering problem is described with a focus on existing design interventions. Following that, literature on persuasive design and behavior change is summarized. The literature review pointed out the gaps in the existing literature and provided insights for selecting a methodology for the research, which are presented in the next chapter.

CHAPTER 3

METHODOLOGY

This chapter introduces the research methodology used for the study and provides background information based on the literature. Firstly, the theoretical background of the data collection method is presented. Then the materials used for the interviews are introduced and their selection process of the materials is described. After that, the sampling approach and participants' background are presented. Lastly, the data analysis process is explained.

3.1 Data Collection Method and Its Theoretical Background

The main goal of the study is to discuss how design interventions should be to encourage prosocial behavior in littering. For this purpose, interviews were conducted with users to understand their thoughts, expectations, considerations and concerns about design interventions and intervention strategies. During the interviews, existing design interventions were used as stimuli. Participants were asked to evaluate the design interventions by comparing them with each other, based on their personal opinions. In order to capture design related dimensions from the participants' perspective, the *personal construct theory* (Kelly, 1955) was chosen to form the theoretical foundation of the study. Besides, the triadic elicitation technique (Hanington & Martin, 2012) was chosen as the interviewing technique, which is grounded on the personal construct theory (Kelly, 1955).

Personal constructs are a collection of similarity-difference dimensions that form people's view of objects, people or events that they interact with (Hassenzahl & Wessler, 2000). These dimensions (e.g. fun-boring, fast-slow, good-bad etc.) form a system in which individuals interpret their experiences of the world (Fransella, Bell,

& Bannister, 2004). Design researchers utilize the personal construct theory for capturing design relevant information from users' perspective (Hassenzahl & Wessler, 2000).

The Triadic Elicitation (Hanington & Martin, 2012) is chosen as an interviewing technique to find out personal constructs. The technique is based on asking (See Section 3.3 for details). Triadic elicitation method is chosen for the following reasons. First of all, the method enabled to reveal participants' idiosyncratic views on the subject. Participants explained their opinions with their own words. Secondly, as no pre-formulated questions asked that might possibly steer their ideas, it potentially reduces the researcher's bias in participant comments. During the interviews, the researcher asked follow-up questions through laddering for in-depth information. A representative case of the triadic elicitation method used in a design research can be found in Sohn & Nam (2015).

3.2 Interview Materials

Hanington and Martin (2012) suggest a total number of six to ten brands, products or services to be used for triadic elicitation. The pilot test showed that using nine products were feasible, providing sufficient sample diversity while keeping the interview duration reasonable.

Design intervention cases were retrieved through a web search by using the following keywords; *littering*, *garbage*, *design*, *trash bins*, *interactive* and *persuasive*. The search resulted in 28 designs related to the study. Nine design cases were selected based on the following criteria:

- ***The design should be manufactured and used in an actual context***: The actualized products or services are easier to talk about compared to conceptual products, sketches and renderings. Besides, actualized products or services depict real life context and surrounding, which is an integral part of product perception.

- ***The design intervention should aim to reduce littering behavior:*** Products that show a deliberate attempt to change people's behavior were selected for the study. Products that involve merely visual transformations to attract users are not taken into account.. This kind of products include trash bins that are subsequently personified by users or artistic trash bins. e.g. trash bin turned into a cookie monster.
- ***The design should have an attempt to change user behavior towards littering:*** Products that choose to tackle the littering problem through persuasion were in the scope of the project. For this reason, products that act autonomously, such as the "Smart Trash Can" of Minoru Kurata are excluded. Kurata's project is a robot trash can that senses an object thrown in the air and catch it before it drops (Aamoth, 2013).
- ***The intervention should not be limited to a written message:*** Products that only use written messages to persuade users are excluded. Such interventions are not in the scope of this study and stands in the field of other disciplines such as social psychology or advertisement.
- ***Variety among intervention strategies should be maintained***: Products intervene using different strategies. Some products make the interaction playful, whereas others attempt to persuade by giving information. Because the aim of the study is to explore as many attributes as possible, only one product was chosen amongst the similar ones. Selection was made based on the clarity of visuals and how well it can be communicated with participants.

During the selection process, design intervention cases related to recycling were not excluded. Although the study takes 'littering' as the problem, recycling is closely related to it. All of the design intervention cases that were selected for the study are described below in Table 2 (Large versions of the images can be found in Appendix E).

Table 2. Design interventions used for the study

Product Image	Product Description
	The trash bin plays a sound when someone throws something in it. It plays the same sound every time and it sounds as if an object thrown down from a high place and the bin is very deep. The text on it is in Swedish and translated as "the deepest trash bin of the world". *Source: http://www.thefuntheory.com /worlds-deepest-bin*
	The product is a machine that collects recyclable materials and offers discount vouchers in return. Vouchers can be used in social activities such as movies or bus trips. *Source: http://inhabitat.com/australia-encourages-recycling-with-cash-for-containers-kiosks/*
	The trash bin allows users to play a Tetris-like game. The bin is surrounded by LED lights that serve as a screen. Each piece of trash thrown in the bin triggers a Tetris block to fall. The initial position of the block that falls down can be selected by timing of trash. *Source: http://www.tetrabin.com*

Table 2. Design interventions used for the study (continued)

	The trash bins are located at a high position to resemble basketball hoops. Users are encouraged to throw their trash from a distance. *Source: http://www.oddee.com /item_99512.aspx*
	The product is a billboard-like panel by the pavement. There are tiny crosses on the middle part of the board that can only be seen from a close distance. People are expected stick their chewing gums onto these crosses to reveal the answer asked on the right side. Source: http://designtaxi.com/news/ 379896/Creative-Installations-And-Ads-That-Aim-To-Stop-Littering-In-London/#ixzz3n81Ld0Jg
	It is a campaign with three steps. First, a mobile crew collects trash samples from streets. Then, these samples are sent to a laboratory where approximate facial images are generated based on people's DNA's. Finally, these images are posted on billboards throughout the city. *Source: http://time.com/3890499/hong-kong-littering-campaign/*

Table 2. Design interventions used for the study (continued)

	The trash bin consists of two equally sized transparent containers. There are two statements written over them; “need more money” and “need more time”. Each statement is associated with a single container. People are expected to vote for one of the statements by throwing their trash. *Source: http://popupcity.net/ wecup-lets-you-vote-with-trash/*
	The product is a trash bin with an overlay that represents people’s uniforms who work in the service industry. Source:https://www.behance.net/ gallery/11028667/Stumme-Diener
	The product is a machine, located at the food court of a shopping mall. The green openings at the lower part are for different kinds of recyclable trash. The circular parts at the top however are there for spraying a sanitizer to users hands. The trash disposal part and sanitizer parts are not connected. *Source: Photo taken by the researcher in Ankara, Turkey.*

In order to describe the products to participants during the interviews, images of all design interventions were printed on separate A5 sized cardboard papers. A5 size was large enough to communicate the products clearly and small enough to lay out all the cards on a table at once. Each product was marked with a letter for clear identification.[4] Two small guide sheets were printed to be used during the second phase of the interview (written 'effective' on one and 'ineffective' on the other). These guide sheets were put on the sides of the table to clarify the direction of the sorting. Each participant received an informed consent form that explains the aim and context of the study as well as the required tasks from the participant. The informed consent form can be found in Appendix F. In addition, a question sheet was prepared to guide the researcher. The researcher read the product descriptions from the question sheet to establish consistency throughout the interviews which can be found in Appendix B.

3.3 Procedure

A total number of 15 interviews were conducted for the study. All of the sessions were video recorded, using a video camera mounted on a tripod. The pilot study revealed that only recording sound would cause confusion, as the participants tend to use body gestures for descriptive purposes or point their fingers when referring to a card. Interviews took place on a variety of locations such as; METU/BILTIR UTEST meeting room, at participants' houses or at their workplaces.

Each session took 50 minutes on average, the shortest took around 40 minutes and the longest took around an hour. Before each interview, participants signed an informed consent form that explains the aim and context of the study as well as the required tasks from the participant (see Appendix F).An overview of the session can be found in Figure 14.

[4] The pilot test revealed that marking the product intervention cards with numbers may cause complication when rating the products.

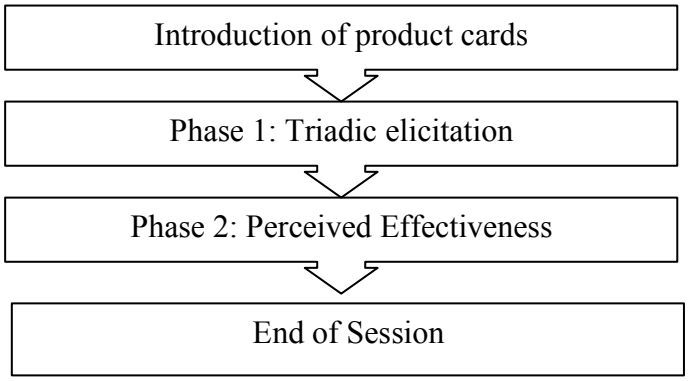

Figure 14. Session overview

Introduction of the product cards: At the beginning of each session, the researcher explained each product to participants verbally, referring to the question sheet. Product feedbacks, inputs and outputs were communicated explicitly to convey overall product interaction. Texts on products were translated to Turkish whenever necessary.

Phase 1: Triadic elicitation: After all of the products were explained, the product cards were shuffled and three random products were presented to the participant. The participant was requested to evaluate the products through asking questions shown in Figure 15.

For the triadic elicitation, a single question asked for each triad of design intervention cards; "How do you think that two of the products differ from the third?" (Hanington & Martin, 2012). Follow up questions were asked using laddering technique to receive in-depth data. Two types of questions were asked to reveal superordinate and subordinate relationships of an elicited construct. (Figure 15)

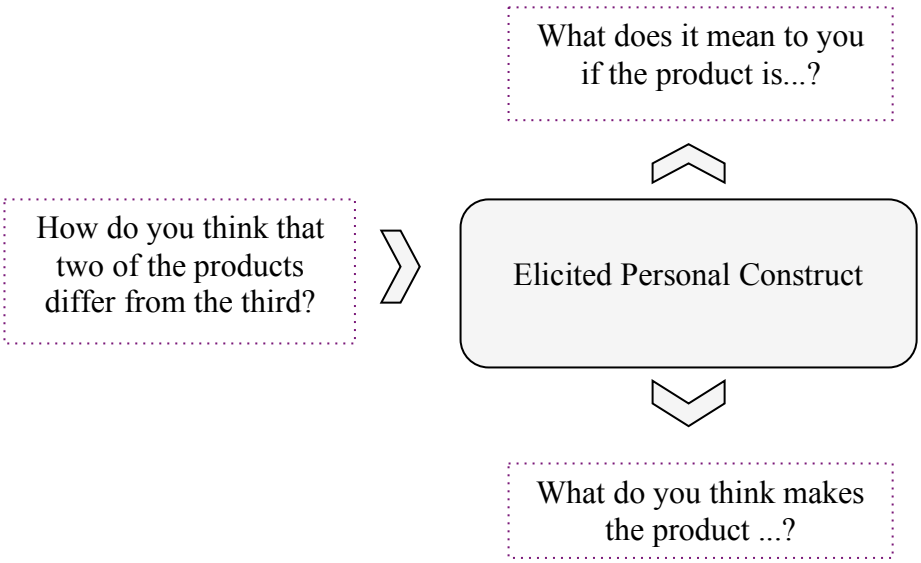

Figure 15. Questions asked to participants for the interview

The researcher noted down comments to a notebook to use for laddering while the participant was evaluating the interventions. Random triads of design intervention cards were kept presented until all of the interventions were evaluated and the participant ran out of any new comments. The number of personal constructs stated by each participant can be found in Appendix I. Each participant has evaluated at least 6 sets of triads. The researcher made sure that each design intervention card was included in these random sets. To do this, after shuffling all nine cards, they were placed on the table to form a 3x3 grid. Then each raw and column of the grid was shown as a random triad.

Phase 2: Perceived Effectiveness: The second phase of the study was aimed to understand the perceived effectiveness of the design intervention cases. Participants were asked to rank all of the products according to their perceived effectiveness. They were first asked to lay out all the cards on the table and form a line that goes from the most effective to least effective (Figure 16). For the assessment of perceived effectiveness of design interventions participants were asked the following questions; Which products would have a bigger impact on changing your littering

behavior? Which ones would be ineffective? Can you please sort them from most effective to least effective and rate them over 5 points, 5 being the most effective and 1 being the least?

This step served as a pre-evaluation, allowing participants to have an overview of all the cards.

Figure 16. A participant is ranking the design intervention cards at the second phase of the session.

Once participants laid out all the cards, they were asked to give scores for the intervention's perceived effectiveness. The rating was done over five points, five being the most effective and one being the least. Participants were asked to think out loud while rating the cards to have a better understanding of their reasoning. Responses were noted down by the researcher.

3.4 Sampling

Participants were selected based on non-probability, purposive sampling (Bernard, 2011). In purposive sampling participants are knowingly chosen due to their qualities (Tongco, 2007).

Education level is an important factor, affecting people's tendency to adopt prosocial behavior. Several studies report an increase in prosocial behavior with education, and there is a study that state the opposite (Gifford & Nilsson, 2014). In order to limit this variable, participants were chosen amongst university students between the age of 20 and 30. Nine men and seven women between the ages of 22-27 were recruited for the study (15 participants in total). The study aimed to capture diverse opinions therefore, participants were chosen from varied professions (Table 3) .

Table 3. Distribution of participants

Participant	*Age*	*Gender*	*Profession*
P1	27	W	Industrial Designer
P2	27	M	Industrial Engineer
P3	27	W	Architect
P4	25	M	Electronics Engineer
P5	24	M	Mechanical Engineer
P6	24	M	Civil Engineer
P7	23	M	Aerospace Engineer
P8	24	M	Aerospace Engineer
P9	24	M	Electronics Engineer
P10	24	W	Teacher
P11	24	M	Civil Engineer
P12	27	M	Computer Engineer
P13	22	W	Sociologist
P14	23	W	Lawyer
P15	27	W	Industrial Designer

3.5 Data Analysis

Following the user interviews, the study went on with data analysis. The initial step was the verbatim transcription of each interview. All of the interviews were transcribed into a single file for easy access. Microsoft Excel software was used for

both transcription and analysis phases. Video recordings were used for transcription and participants' hand gestures were noted down whenever necessary as participants often referred to products by pointing at them.

Content analysis and thematic coding were used for interpreting the data. The data was managed in two cycles, as recommended by Saldana (2015). The first cycle coding was more of an exploratory process. Figure 17 illustrates a screen shot from the first cycle coding of the interview data. At this cycle, first, the whole text was divided into small sections that consist of one or more related sentences. Then, these sections were coded under two levels of interpretation. The first level was called "constructs". Here, initial themes were defined for each relevant quote. Irrelevant quotes were kept in the file but not coded. The second level was called "attributes". Product features were noted down under this category. Apart from constructs and attributes, there were three other columns in the analysis sheet. Two columns named "positive" and "negative" were used to mark the participants attitude towards a mentioned quote. This step was necessary as participants sometimes had contrary evaluations for the same attribute. For instance; participants P06, P07, and P09 stated that a product that allows multiple users to play a game is a favorable thing because it elicits competition. On the other hand, participant P01 and P06 think the opposite way about the same feature, arguing that they feel frustrated playing games with other people in public. Marking positive and negative comments made contrasting opinions easier to notice. Finally, a column was dedicated for taking notes to point out interesting parts of the data for further discussion.

P#	Line #	Timestamp		Ürün no	Attribute	Constructs	Positi	Negati	Notes	Secondary Const
P02			Bunda da biraz eğlence unsuru var ama buradaki rakamı gördükten sonra insanlar eğlence kısmını kaybedebilir. Bu kadar para harcanıyor mu yere attığımız sakızı temizlemek için diyebilirler.	E	Product informs people about how much money spend as a result of their action	Informing about consequences	1			Forceful
P02			Burada asıl etkileşimi yaratan yazılar.	E						
P02			Bunda dışarıdaki ışıkları ve şekilleri görsem bu neymiş diye bakmak için giderim yanına. Çöp kutusu mu değil mi onu bile düşünmem.	C	Product has lights	Intriguing	1			Curiosity
P02			Bunlar baya enerji de harcıyorlar. Elektrik enerjisi. Bu boyutta olduğunda harcanan enerji önemli benim için. Bu kadara gerek olmayabilir. Her taraf ışıl ışıl biraz fazla.	C	Product requires high amount of energy to function	Environmentally friendly		1		
P02		35:40:00	Tetris beni direkt 10 yaşıma filan götürdü. Işıl ışıl rengarenk olması ve tetrisi kelimesi banim için çocuksu yapıyor. Çocuksu olması iyi ya da kötü bir şeydir diyemiyorum. İkisinini de denenmesi lazım.	C	Product resembles a childhood game	Evoking old memories			Age	
P02			Şu ciddiyette olması güzel bir şey, hem çocuksu bir etkileşimi var sakız yapıştırdığın için. Hem de ortaya çıkan ciddi bir bilinç var vermeye çalıştığı.	E	Product motivates people to adopt prosocial behaviour through a game	Game-like interaction	1			Informing about consequences
P02			Burada sadece çocuksuluk var. Bu kadar çocuksu olması çok da güzel bir şey olmayabilir.	C	Product has colorful elements, resembles an interactive child game	Game-like interaction		1		
P02			Bu diğerlerine göre biraz daha keyifli. Bir basket potası görüyorsun. Hiç olmazsa sevdiğim bir sporu çağrıştırıyor bana.	D	Product has a resemblence to a sports game	Intriguing	1			Fun
P02			Burada mesela biraz daha uzağından atarım çöpü. Gidip dibinden sokuşturmam. Daha uzaktan sallarım. Hepimizin sevdiği bir şeydir. Ben mesela tuvalette de elimi kuruladıktan sonra önce bir uzaktan atmayı denerim. O anlamda biraz daha ilgi çekici benim için.	D	Product has a resemblence to a sports game	Intriguing	1			Fun
			Bunların ikisi silindirik. İnsanların görmeye alıştığı çöp kovası tarzı silindirik mi diye düşündüm bir an. Bu açıdan bana daha sıcak geldi	G C	Product has a similar form to a conventional	Product's function				

Figure 17. A screenshot from the first cycle of coding

Second cycle coding was about rearrangement and reclassification of the existing codes (Saldana, 2015). During this phase, codes were refined in a separate Excel sheet as shown in Figure 18. Constructs with same or similar meanings were rephrased and combined.

Forceful	G	Products content is updated regularly	P04	Curiosity		
	B	Colors on the product reminds road or construction signs.	P03			
	F	People who throw trash are exposed publicly	P14	Shame		
	F	People who throw trash are exposed publicly	P05, P06, P15	Shame		
	F	Product collects personal information without consent	P13			
	F	Product makes people feel that they are being watched	P04	Security		
	D	Product does not enforce anything whether a person throws his/her trash correctly or not.	P03			
	B	Product forces people to learn something	P03	Raising consciousness		
	F	Product imposes a behaviour which may cause undesired outcomes.	P04	Misuse		
	E F	Product intimidates people about consequences of their actions	P02	Raising consciousness		
	F	Product intimidates people about consequences of their actions	P07	Raising consciousness		
	F	Product intervenes other peoples freedom	P04			
	B I	Visuals on the product reminds governmental institutions	P01, P03			
Game-like interaction	C	Gaming experience offered by the product does not match with users	P01			

Figure 18. A screenshot from the second cycle of coding

CHAPTER 4

RESULTS

This chapter presents the findings of the research. It starts with explaining the dimensions derived from the user interviews. Then it gives the results of the perceived effectiveness survey. The chapter concludes by discussing the findings. The quotations included in this chapter were translated to English from Turkish. Quotations are numbered in the text and the original quotations can be found in Appendix B.

During the analysis phase various dimensions were revealed, which were grouped under three categories (Table 4). Dimensions that were identified as essential for a product to have a persuasive impact were categorized under *fundamentals.* Dimensions that suggest a persuasive approach were placed under *strategies*. Lastly, constructs that point out important aspects that should be considered while designing interventions were categorized under *considerations.*

Table 4. An overview of dimensions

Fundamentals	***Strategies***	***Considerations***
Clarity of Functionality	Gamification	Discrimination
Clarity of Usage	Promote Competition	Privacy
Ease of Use	Facilitate Personal Opinion	Reliability
Noticeability	Evoke Old Memories	Preventing Misuse
Applicability	Rewards	Sustainability
	Inform About Consequences	Visual Appeal
	Elicit Empathy	Attractiveness
	Shame	Hygiene
		Forcefulness

The distinction between fundamentals and considerations were determined based on participant comments and the researchers interpretation.

4.1 Fundamentals

Amongst all of the dimensions, the ones that were related to the core functionality of the products were grouped under this category.

4.1.1 Clarity

In order to persuade users, products must clearly express their functionality and usage. These two aspects of clarity are explained in the part respectively.

4.1.1.1 Clarity of the Product's Functionality

In order to be able to convince the user to change his/her behavior, first, the design intervention should be easy to identify. The current study showed that recognizing a product's functionality is a user concern. Some of the products were stated as easy to understand considering what it does, whereas others were found to be complicated or vague in terms of its function. Products' resemblance to other products or activities, written texts on the products and products' simplicity were found to be associated factors with the clarity of products' functionality.

Participants easily identified products with a similar appearance to conventional trash bins. Cylindrical form was one of the main indicators. Functionality of the cylindrical products such as A, C, D and G were clear for participants. A second indicator was trash openings. Gaps on the products afforded people to throw something in.

Interviews revealed that using forms that are associated with commonly known activities helps to clarify product's function. Product D, a trash bin design that looks like a basketball hoop, triggered people to think that they are supposed to throw something in it. Supported with written message on the product, it was clear for

participants that it is a trash bin [01]: "[You understand the product's purpose] at first sight and throw your trash away like shooting a basket." (P04 on product D)

Using a global language such as English was found as an important factor on products understandability. Using a local language, like Swedish used in product A, limits the targeted user group. It excludes people who do not know that particular language and hinders the interventions capabilities of global promotion [02]: "The product does not make a sense for tourists, who do not know the local language, or for people, who are illiterate, if there is no text on it. In that case, it does not go beyond a standard garbage bin." (P12 on product A). Likewise, another participant stated that [03]: "Let's assume I don't know English. I may think this is a cashpoint or something." (P13 on product B)

It was found that participants easily identify products that look simple. Products A and D were both uncluttered objects and they were expressed as easy to identify. Furthermore, interviews revealed that objects that look complex might discourage users from using the product. Two possible reasons were identified for this behavior. Firstly, if the product has fragile parts, people may worry about damaging the product [03]: "Sometimes, I come across to objects, which I can't give a meaning. I may consider this as one of them. I do not want to give harm because I do not have good knowledge about it." (P15 on product G).

Secondly, people may not want to waste time by trying to understand its purpose [04]:

> I don't think people will throw their trash in this bin. Because when you make the device complicated, people will abstain from throwing. There could be some cultural differences as well. When a person comes in front of this, s/he will think about it; begin reading if there is an instruction, [asking] what does it expect from me? What is the reason of the wholes on it? Sure s/he will be pondering over these. (P12 on Product I)

4.1.1.2 Clarity of the Product's Usage

In addition to understanding what a product's function is, participants also commented on their perception of how to use the displayed products. It was found that understanding a products' functionality was not sufficient for understanding how to use it.

Printed instructions are a way to communicate how a product should be used. Regarding this issue, participants expressed varied opinions. Products with short and clear instructions were evaluated positively, whereas long and extensive instructions were found to be frustrating.

Moreover, products should provide sufficient instructions about their usage. In cases, which a product offers a personal benefit such as product "I", the benefit should be described clearly [05].

> ... my first impression is getting my hand into here [a part of the product]. When I see something like this, the first thing in my head is this thing's inside being dirty. But I wish there was a text on it like it cleans this much in 5 seconds, it clears up the dirt, there is no way [of dirt] to come back to you (P02 on product I).

Lack of instructions causes ambiguity in products usage, which might deter users from using the product or lead to misuse [06]: "I wonder what does it [the trash bin] expect to throw in here? This is unclear. Will I throw pet or paper? If it is not specified, I can throw my any kind of trash in here. I think there is lack of information for the person who sees it for the first time." (P04 on product G).

Graphical design plays a prominent role in the clarity of products usage. Descriptions in large text were stated to be more attractive and easier to be read from a distance. Also, using graphical elements to direct users were found positive [07]: "The guidance [of the trash bin] is very nice. The spot for throwing trash is painted largely." (P04 on product B)

4.1.2 Ease of Use

Participants expressed their concerns regarding the usability of product interventions. These were mostly practical issues, which products physical features make the desired action hard to do.

Reachability of the garbage opening is stated as a negative factor affecting product usage. Various comments on reachability include location and size of garbage openings. For instance, product G has two elevated garbage containers. Participants P02, P08 and P15 stated that the product is not easy to use because of its height [08]: "This one seems quite high. I am not sure if I am tall enough to reach it. Or would it [trash bin] tip over while throwing anything? I will throw my teacup for example, some tea remains inside [in the cup]. " (P15 on product G)

Apart from height, size of the opening was also found important. Products A and I are two products that were found hard to use because their garbage openings were found small [09]: "Also the wholes are too little. No one bothers with these kinds of things in our country." (P10 on product I)

Accessibility of the garbage opening is also mentioned as a factor. If the garbage opening is not visible or obscured by other elements, then the usage is affected in a negative way.

Products that demand more physical effort than it should normally require were found negative. For example, product G requires users to step on a platform before disposing their trash. Two participants mentioned that the platform demands too much effort, which may discourage people from using the product. Such products are particularly unfavorable for elders [10]: "For example I see teenagers and youngsters on it [the stand], but I don't see any elderly person. People need to go up [the stairs], which is a barrier. I think people would be challenged physically" (P01 on product

G). People with disabilities should also be considered if the product is intended for public use.

4.1.3 Noticeability

Design interventions should be noticeable to be effective at the first place. They should be distinguishable from the rest of the conventional products. Various product attributes were found that make products more noticeable.

Products with lights are stated to be more noticeable. For example, product "C" uses a grid of LED lights that lets users play a Tetris like game. Primary function of these lights is to establish a visual communication with the user. However, it also increases the noticeability of the product, making the product more likely to be used. P08 says that [13]: "Maybe I am distracted and I have garbage in my hand. Maybe, this light would help to get my attention and look up at it [the trash bin]." (P08 on product C)

Large products are found to be more noticeable than small ones. Products "B" and "I" are machine like products with large enclosures. Their size is mentioned as a factor that increases their visibility [14]: "This is a kiosk, a tool designed for this purpose [persuading for throwing trash] and it stands there in it's huge form [quite visible]. Therefore, I am aware of its' existence." (P08 on product B)

Using bright colors to attract people is also an effective way. It was stated that even though a product's shape and size are ordinary, using bright colors can make it noticeable.

4.1.4 Applicability

Design interventions should be easy to implement. They are not perceived as effective if producing or installing them are not perceived as worth the effort.

Design interventions were criticized on the perceived costs of their execution. Such products may be perceived as redundant due to the belief that they require too much resources and effort compared to the impact they create [15]: “This one’s implementation is difficult and takes so long time. In the end, it would not be conveniently available in everywhere. The steps are taking the trash from the ground and making a research of it [for DNA]. It has so many steps and it is tedious.” (P09 on product F)

Therefore, investing too much time and effort into an intervention may generate negative impressions for users [16]: “What is the big idea? Analyse the DNA for other things. [instead of such effort]” (P15 on product F)
On the other hand, products that create a large impact compared to their costs were found positive.

Present social norms in a given situation are other factors that affect products applicability. If littering is accepted as a common thing to do within a society, then some interventions will fail to have an impact on people’s behavior [18]: “It would only work if we are in a city where 1 person out of 100 throws the trash away.” (P11 on Product F)

4.2 Strategies

Dimensions that suggest an approach that can be used for persuasion purposes are categorized under strategies. These strategies were derived from the selected design interventions. In this section users perception of these strategies are presented.

4.2.1 Gamification

Throwing trash in a trash bin and keeping the environment clean is considered as a mandatory behavior. Turning this obligation into a game-like experience has the potential to effectively change user behavior. Design interventions that ask users to complete puzzles, emits sounds or resemble sports games were considered as game-

like interventions. The study revealed several factors that should be taken into consideration when designing for game-like experiences. [19]:

> I would love to do this. In fact, enjoying while throwing trash would not be something people would love. But I think I would love it while throwing my trash away [since] you are playing while throwing trash (P07 about Product C).

When creating a game, the number of players should be taken into account. If the design intervention is designed for public spaces, a multiplayer game will cause random people to interact with each other. Results showed that this may not be a desired situation, which has two possible reasons. Firstly, people often want to play games with others with a similar skill level. In a public setting, users may feel frustrated if they end up playing a game with someone who is much better or worse than them [20]: "If others' playing slows the game, it would bother me. I want to see the outcome of my action immediately" (P01 on product C). The second reason would be that people may feel uncomfortable interacting with strangers [21]: "This is not something I would play alone. Ten people are coming together and throwing trash. I will definitely want to play the game alone at some point. This [trash bin] would be more meaningful, if I were able to play with it alone." (P11 on Product C).

On the other hand, involvement of others has the possibility to trigger the desire for competition. This aspect of having multiple players is elaborated in the next topic.

Giving reference to a commonly known sports game can be used to make an interaction game-like. Product D, which resembles basketball, is an example for this approach. It is stated that young users may be more attracted to this strategy [22]: "In this one, I might try squeezing a pet bottle and throw away in any of these. I might even try again if I could not shoot." (P05 on product D)

Although making associations to other experiences is a good way to trigger people, it may also bring up expectations. People will recall their past experiences and

compare it with the one in front of them. A potential mismatch between what is offered by the intervention and what is expected by the user may cause users to feel disappointment and frustration. For instance, Product C offers a Tetris-like game. Unlike the conventional Tetris game played on a game console with buttons, this one is played by throwing trash. This change in game controls causes the game to be played in a slower rate than what participants are used to. The difference between current experience and users expectations results in a negative experience [23]:

> I used to play Tetris very fast. I used to make fast moves using the buttons spontaneously. I had very high records. Now, this is something, which does not meet my expectations from Tetris [because you need to wait for others' move]. This would annoy me. (P01 on Product C)

Game-like interactions are found to be more suitable for children. Colorful elements, lights and sounds are main elements that make people think so. A common opinion is that motivating children to adopt prosocial behaviors from a small age is a positive thing. However, depending on cultural values and age group, people have a tendency to find game-like interventions too childish. This may prevent them from interacting with the product.

Lastly, products that turn an insignificant object like litter into a game object evoke a sense of pleasure as the design intervention assigns a meaning to the litter and makes it functional again [24]: "Trash you would normally throw away gains a value. I can actually do something with the trash in my hand. It becomes a functional object." (P04 on Product C)

4.2.2 Promote Competition

It was found that facilitating a competitive environment has the potential to persuade people to behave in an intended way. Whether it is a competition against another person or an aim to reach a personal goal, people like the feeling of accomplishment. [24]:

> We have the drive of playing which we can't resist. We play coin-operated machines. This trash bin is the same with those but you play a game by throwing your trash only for instance. This one [trash bin] takes attention [by giving the sense of] "This time, I will do this, now it will be!" thing. (P13 on Product C)

Allowing multiple players to play a game will often result in competition. It was observed that people have a tendency to compete if proper conditions are offered This way multiple people can be directed towards the desired feeling [25]: "A group of people may come together and turn this [trash bin] into a competition. From this perspective, I see this [garbage bin] as a way to attract groups as well. Therefore it is unique." (P09 on Product D)

4.2.3 Evoke Curiosity

Interventions that evoke curiosity can trigger people. Original strategies that evoke curiosity would help to attract attention and elicit positive emotional reactions (Hansmann & Scholz, 2003). Overlapping attributes were found between evoking curiosity and gamification. However, they are aimed at different psychological processes. Gamification is related to the feeling of achievement whereas curiosity is related to discovery.

Design interventions that offer a reward can evoke curiosity if the reward is unknown to the user beforehand [27]: I would definitely try this. I could try it 20 or 30 times to find out all the rewards. I would store my trash to throw it in this one. It will offer me discount tickets and I feel curious about it." (P02 on Product B)

Products with technological parts and interfaces evoke curiosity. Components like lights, buttons, screens are all indications of interactivity, thus a function.

Product “A” has been stated to evoke curiosity because of the sound it plays. If a user is initially intrigued by graphics or other people, then playing sounds may be used for persuading user to have a closer look at the product.

4.2.4 Facilitate Personal Opinion

People tend to express and support their own ideas. Whether it is a football team or just a color, they would take action to show their choice. This human tendency can be exploited to design effective interventions.

For example Product G provides a voting platform that asks peoples opinions on a specific subject. It consists of two separate trash containers made of a see-through material. There is a statement over each container. On one container it says, “Need more time”, and on the other one “Need more money”. People are expected to vote for one of the statements by throwing trash in a container.

This approach was found to be particularly positive if the content is interesting for the target group. Asking for popular content appears to be a good way to persuade people to participate. Questions about popular sports, artists or personal preferences like colors or seasons are easy to answer [28]:

> This could definitely turn into something very persuasive if you make people vote for different pairs. For example, if it is Fenerbahçe vs Galatasaray, I would throw my trash just because I support Fenerbahçe. This can be a very effective solution for the littering problem. (P02 on product G)

On the other hand, political topics are controversial. When asked at a right time, political topics may trigger people to vote [29]: “If it is done between Trump and Clinton right before the elections, it could be a very good social experiment. It is very open-ended, it can be transformed into a very good thing.” (P13 on product G)

However, designers should be careful about sensitive topics. In some cases political views can be sensitive as well. People may not feel comfortable about expressing their opinions publicly.

Location and timing of such interventions is rather important. For example for a sports game, a trash bin asking for which team to win can be placed closer to stadiums or to places where people watch sports. If is right before an election, the intervention will be most effective if it is placed in a time close to the election day.

4.2.5 Evoke Old Memories

Evoking, childhood memories makes people approach to an intervention more positively. For example, Product C has a resemblance to an old video game Tetris. Considering the age span of the participants, Tetris is a game that they have played in their childhood. Thus, Tetris is a reminder of their childhood memories.

Product E is a puzzle-like installation on a vertical board. People are expected to complete it by sticking chewing gums on to designated points. It has similarities with exercises in children books that ask for you to connect dots to reveal a figure [30]:

> This one is like a school thing [assignment]. As if you want to arise curiosity of children... like the puzzles we solved. We used to connect the dots like this... This reminded me of it. Maybe this one [trash bin] is trying to provoke our subconscious by reminding of our childhood memories. (P10 on product E)

4.2.6 Rewards

Products that offer personal benefits/gains are already recognized as powerful strategies to change behavior. It was stated under different names such as “Eco-spur” (Bhamra et al., 2011), “Rewarding” (Lockton et al., 2010) or “Reciprocation” (Cialdini, 1993) This kind of positive reinforcement was also salient in the current study.

Offering personal benefit through economical means was stated as the most obvious way of rewarding. For instance, Product “B” is a recycling machine that provides discount tickets in return for recyclable materials. Majority of the participants have commented positively about the product, stating that having an economical benefit would motivate them to use the product [31]:

> Here, after you dispose a product it offers a choice for another product. This way, it offers an economic comfort. You buy a product for 1 TL and save 50 kuruş for the next one, it is economically comforting." (P07 on product B)

It has also been stated that people may pay further attention not to damage the product since it is "doing a favor".

Despite all the positive comments about rewarding, interviews have revealed the possibility of a "motivation threshold". Personal benefit offered by the product must be sufficient enough for users to perform the desired action [32]:

> The mindset of most people would be like "paying anyway". Maybe the man has a plan to go to a movie and maybe he walks across the road. I do not think he will see a value in walking across the road, throwing trash and taking the coupon." (P08 on product B)

Another way of personal gain is providing a service that benefits the user. Product I is a recycling unit that also offers hand sanitization. Participants have also perceived the service as a form of personal benefits and commented positively.

4.2.7 Inform About Consequences

People can be inspired to act for the benefit of the society if they are made aware of the consequences of their actions. Providing facts about environmental or economic damage will make users realize the severity of their behavior. Therefore, it will help to steer their behavior to the desired state.

People are inclined to behave more thoughtfully if they are informed about the negative outcomes of their actions [33]: "These two [products] aim to persuade people through information. The more someone has knowledge about the negative consequences of his/her actions, the less they would do [litter]." (P07 on products E & H)

For example, Product E is a billboard like panel that displays the total cost of removing gum from streets each year. The high amount of money stated on the board draws the attention of participants. Participants expressed emotions like, guilt and responsibility. They also associated high cleaning costs spent by the municipality with their personal expenses. This link made them think that the more damage they inflict, the more money goes out from their own pocket [34]: "This [trash bin] informs that we [the authority] clean the streets from gums you thrown away by spending 56 million pounds. I mean a message like if you throw gums lesser, this amount of money will return to you would be perceived [from this effort]." (P07 on product E)

The way of presenting the information is found to be an important factor. It must be conveyed in a striking and memorable way. Furthermore, the information must be presented in a way that users can perceive and relate to their own lives. Instead of giving numerical values, like how much money it costs to clean up, associating that amount with daily incidents are suggested [35]: "Here, it could be stated that 56 million pounds can cover the expenses of 1 million unemployed people. I mean you can still give numbers but it can be about a concrete example." (P12 on product E)

4.2.8 Elicit Empathy

Making people see a problem from another person's point of view have the potential to increase their awareness on the subject. Elicitation of empathy is also suggested as a persuasion strategy in the literature: "There is the potential to influence user behavior via emotional interaction e.g. through empathy (displaying or engendering) or through triggering particular associations or personal significance for users." (Lockton, 2012, p. 9)

Design interventions that make people think about wasted resources and people in need can be used as a strategy. Product H, is a trash bin covered with an overlay that is associated with people's uniforms who work in the service industry. This association was perceived as a reminder of people who clean the litter [36]: "This

seriously affected me when I saw it. It gives a message like; if you throw your trash on the floor be aware of who cleans it up for you." (P05 on product H)

4.2.9 Shame

Exposing people publicly for performing an undesired behavior was found to be a controversial strategy. Although this strategy had a potential to be used in some cases, it was considered as a sensitive topic. It should be noted that the currently proposed strategy is different than the strategy of "guilt" categorized under educational strategies by Lilley et al. (2005). The current strategy aims to identify and expose someone publicly other than eliciting the feeling of guilt through information.[5]

Shame is stated to be a strong trigger for changing user behavior. However majority of the participants have expressed their concerns about ethical issues and possible rebound effects [37]: "I think exposing someone, blacklisting or suppressing through fear are not effective ways of solving a problem." (P08 on product F)

4.3 Considerations

Dimensions that pointed out important factors were categorized as considerations. Considerations are not as critically important as fundamentals. However, they offer valuable insights that may have an impact on the effectiveness of the design interventions.

4.3.1 Discrimination

The study revealed concerns towards discriminating messages. Any kind of sexist or racist connotations should be avoided. These kinds of offensive messages collide with people's personal values and prevent the persuasive "message" from being

[5] Lillet et al.'s (2005) strategy is similar to what is proposed in the "Inform About Consequences" strategy in this study.

delivered. Violating personal values can disqualify a persuasive strategy which would otherwise have the desired affect (Zachrisson & Boks, 2010).

A commonly seen strategy in persuasive design is to personify a product by making it look like a human. However, designers should be particularly careful with human-like shaped products, as it can convey unintended messages. For instance, a similar approach was taken in product G. Because the trash bin was covered with a graphical overlay that represents various uniforms, the overall product resembled a human torso. Though, because the trash opening was located at a level where the neck should be, the overall experience was perceived as "throwing trash down to someone's throat". Furthermore, because the overlays on the trash bins represented different occupations, throwing trash into them was discerned as an insult to those occupations [38]:

> This is like a discrimination against occupations. Why is there no pilot or doctor uniform here but a bellboy or housemaid? People who have these jobs may misunderstand this and it may damage some parts of the community." (P06 on product H)

4.3.2 Privacy

Persuasive products may require people to perform an action in a public setting. Interviews showed that making people stand out in front of a crowd may be a limiting factor for the target group. Some people may not feel comfortable with being at center point of the attention [39]: "I think it is a bad thing to be in sight when throwing away your garbage. You should be doing it anyway. It should not require anyone to watch you while you do it. You would normally be throwing away your garbage." (P02 on product G)

4.3.3 Reliability

Design interventions should be reliable, particularly when they interact with individuals at a personal level. If the intervention strategy requires to identify users, then this should be done accurately. Products that direct wrong accusations are unacceptable. [40]: “Here, a person may have dropped the cigarette while waiting. He/she may have dropped something that may seem like littering.” (P12 on product F)

4.3.4 Preventing Misuse

Products that are placed in public places are often prone to get abused. Apart from inevitable circumstances, like vandalism, the study revealed some cases of misuse that can be avoided through better design decisions.

For example if the adopted strategy is rewarding, then the reward should be offered when the desired behavior is performed. If not, people can grab the reward without doing anything. Furthermore, if the expected task from the user is too challenging, then the user may get frustrated.

4.3.5 Sustainability

A product’s functionality should be consistent with its intentions. If a product is aiming to change user behavior for a better environment, the product itself should be sustainable as well. Otherwise, users would question the honesty of the intervention.

Products that contain many electronic parts like lights, sensors and screens were perceived as highly energy dependent. Therefore they were criticized as being inconsistent with their aim of preserving the environment. Similarly, products made of unsustainable materials were disapproved as well.

4.3.6 Visual Appeal

A product should be visually appealing to encourage the user for interacting with it. Graphical elements, materials and forms were all found to be important factors that

shape users' views about the design intervention. This indirectly impacts the effectiveness of the intervention.

Colors determine how much attention a product seeks for. Warm and saturated colors attract more attention whereas cold and desaturated colors attract less. The study showed that a design intervention should request the right amount of attention. Some designs were criticized for being too distractive and others for being too dull depending on their colors.

4.3.7 Attractiveness

Design interventions should grab users attention and attract them to be effective. The study revealed several factors that play a role in making the product intriguing. Although it may seem like this consideration is similar to "Noticeability" which is proposed under the Fundamentals, there are differences. Users should be able see and identify a product as something different than the rest, before even starting to think about engaging. This is what was meant by Noticeability. Attractiveness however, is the next step. The data grouped under this category is about attributes that make the product interesting and trigger people to engage with the product.

Product attributes that were found to attract people are listed below;

- Technological parts are found to catch users interest as they indicate an interaction.
- People would like to see other people's opinion on a subject.
- Physical task like reaching or throwing were found to set off curiosity.
- Figures that represent human faces grab people's attention.
- Content which is updated regularly make people wonder.

Products with lights and sounds also help to grab user attention. However, it was commonly stated that giving a single feedback over and over again has a very limited

persuasion capability. Once users learn what to expect, the intervention becomes dull and boring, therefore loses its effectiveness drastically.

4.3.8 Hygiene

Comments related to products' cleanliness are categorized under hygiene. Since all of the selected products are installed in public places, they are used by a lot of people everyday. Participants indicated their concerns about both their personal hygiene and the cleanliness of the environment.

Touching an area that is frequently touched by others was expressed as one of the most important hygiene concerns [42]: "Why would I get my hand into something everybody gets their hands into?" (P02 on product I) People also do not want to interact with something that is close to someone else's trash.

Similarly it was found that people may feel uncomfortable with placing their hands into place which is not visible from the outside. For instance, in product "I", users are expected to insert their hands through openings and the device sprays a hand sanitizer. However, users cannot see their hands once they place them inside the device [12]: "If it was transparent and it showed inside, the concept would be better. For example, a lot of people may get their hands into it. This makes me think about the hygiene." (P04 on product I)

For products that aim to collect litter in common areas, all sorts of litter, including liquids, should be considered. Having openings that may cause leakage can also cause hygiene problems.

4.3.9 Forcefulness

Users can experience design interventions as forceful. In some cases, this can be the desired effect, especially if it is backed up by an authority, which can impose sanctions. However, interventions may also be experienced as forceful without

designers' intentions. Therefore, designers should be aware of the attributes that may cause forceful experiences. Depending on the level of forcefulness, users may show a reaction which may cause the intervention to fail or lead to rebound effects. Products that reminds of governmental institutions were found forceful by the participants. Fonts, colors and texts play an important role in this effect [41]: "It looks a lot like ministry of health. It feels like it is the government that tries to make me do something. It creates a hidden government pressure on me." (P01 on product I) Furthermore, black and yellow colors used in product B reminded users of the signs used for road constructions.

Product attributes that create a feeling of surveillance are perceived as forceful. Similarly, collecting personal data without user consent and publishing it was found as forceful as well.

4.4 Perceived Effectiveness of Design Interventions

One of the aims of the research was to find out which intervention strategies were perceived as more effective. For this purpose, participants were asked to score the perceived effectiveness of design interventions. Design interventions were scored out of five points. Mean and standard deviation values were calculated and presented in Figure 19.

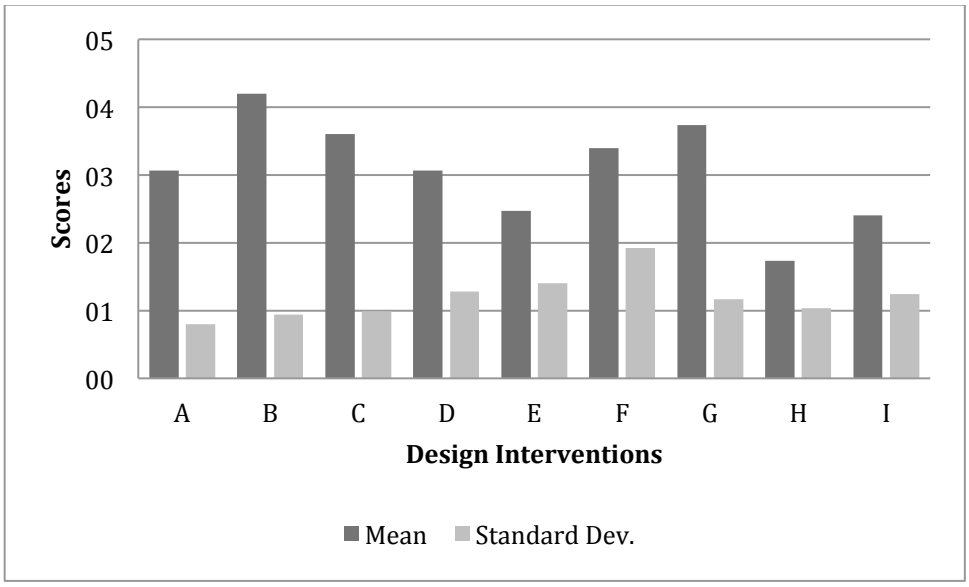

Figure 16. Mean and standard deviation values of perceived effectiveness of design interventions

The results showed that B and G were perceived as the two most effective design interventions. (Figure 20) The strategy adopted for product B was “rewarding”. The product offered discount tickets for various events for the exchange of performing the desired behavior. The product G however, made use of the “facilitate personal behavior” strategy. People were asked to vote for a statement using their trash.

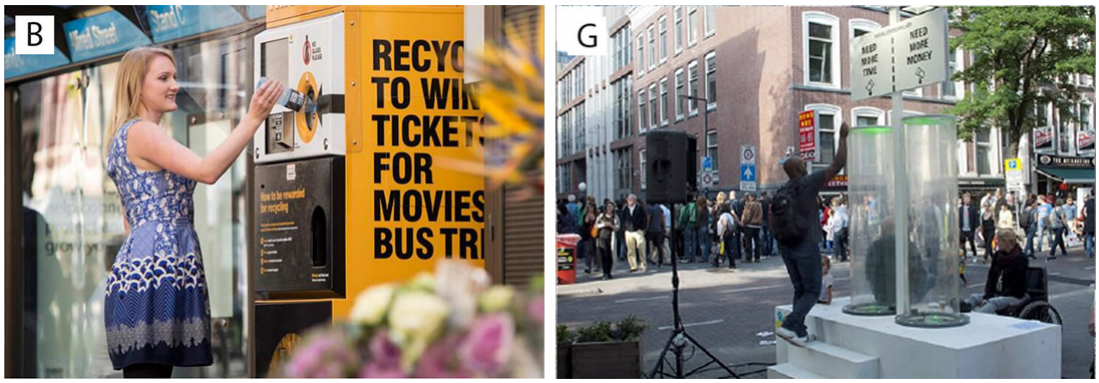

Figure 20. Two most effective design interventions

Design interventions H and I were perceived as the least effective design interventions (Figure 21). The strategy adopted by product H was “elicit empathy”. The product was a set of trash bins covered with an overlay that represents people’s uniforms who works in the service industry (such as a bellboy, housekeeper or a servant). The strategy used by product I was “rewarding”. Product I was a recycling unit that offers hand sanitizer.

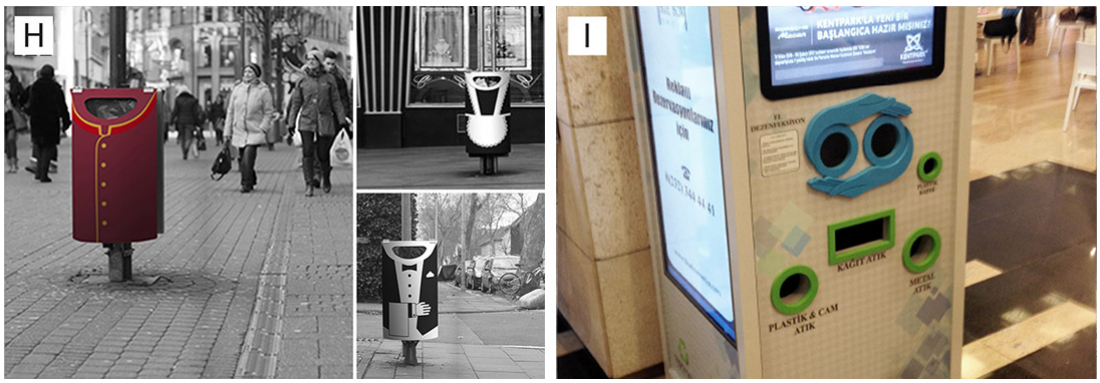

Figure 21. Two least effective design interventions

Product F showed the highest value in standard deviation. This finding is discussed in the “4.5.2 Perceived Effectiveness” section.

4.5 Discussion

4.5.1 Discussion on strategies for designing effective interventions

Gamification is proposed as a strategy in the current study. It is suggested that game-like elements will catch people’s attention. Fun experiences can motivate people to behave in a desired way. This strategy is similar to what is called *playfulness* in the persuasive design literature (Lockton, 2013). Furthermore, gamification is a broad topic and more research can be found in the design and human-computer interaction domains.

Promoting competition is suggested as another strategy. Although competition is suggested as a motivating factor in the digital persuasive games (Jayant & Saponas, 2005) it was not explicitly stated as a persuasive strategy in the field of persuasive product design.

The study identified that evoking curiosity can be utilized to direct people towards a behavior. People will most probably take action to find out about a mysterious artifact. This strategy of triggering curiosity to persuade people has been used or suggested in other studies as well (Lockton, 2013; Tromp, 2013). The current study supports the existing literature and puts forward that evoking curiosity can be used for persuasion purposes.

Facilitating personal opinion is another strategy proposed in this study. It means that people are inclined to express their ideas on a subject. If proper situation is offered to users, they will be likely to show their support to their favorite football team, singer, movie etc. This human tendency is mostly visible and prominent in social media which people are expressing their opinion about almost every topic. Although this strategy is apparent in our daily lives, it is not yet included in the current persuasive design literature.

The research found that evoking old memories result in a positive attitude towards design interventions. Hence, it can be used as a strategy to tempt users towards the desired behavior. This strategy will require designer/design researcher to conduct a research to find out about target groups' background and preferences. Childhood games, products, characters or songs can be used for this strategy. Similar to the previous strategy, evoking old memories is not included in the existing literature as well.

Persuading people through offering rewards is one of the most well-known and widely used strategies. This strategy is in line with *reciprocation* (Cialdini, 1993b), which means that people would like to return the favor. By offering something with a

personal benefit, people can be persuaded towards a desired behavior. This approach is also is recognized in the field of persuasive design (Lockton, 2013; Tromp, 2013) and the current study supports these previous findings.

Informing users about possible consequences of their actions is identified as another persuasive strategy in this research. As users acquire more knowledge about the significance of their behaviors, they are expected to behave more responsibly. This strategy is also recognized as *eco-information* (Bhamra et al., 2011). However, the strategy proposed here is not giving user specific feedbacks, which is considered as eco-feedback for some scholars (Bhamra et al., 2011).

Eliciting empathy suggests that allowing users to see a situation from another person's point of view will result in a shift in users perspective, resulting in a more responsible behavior. However, designers should be careful about the message conveyed through their products. Vulgar and humiliating messages towards other people, occupations, races or sexes should be avoided. Although this strategy can be found in the existing literature (Lockton, 2013), it suggests a more straightforward approach [6]. The strategy proposed in the current research however, considers products as the communicator. It requires more cognitive effort and awareness from the user.

Shame is the last strategy that was put forward in this study. It is another widely used approach to persuade people towards a behavior. This strategy involves more than just generating the feeling of guilt through information as proposed by some studies (Lilley et al., 2005; Lockton, 2013). It revolves around forcibly exposing someone in public because of the undesired behavior. Consequently, according to participant comments, shaming is the most controversial one amongst all of the strategies. A designer should keep in mind that the effectiveness of such a strategy is dependent

[6] Lockton (2013) gives the example of social media as the platform to see other people's opinions.

on personal and social norms. Mismatch between the application of this strategy and present norms will render the intervention ineffective.

4.5.2 Discussion on Perceived Effectiveness of the Strategies

The perceived effectiveness test revealed user opinions about each strategy's ability of changing user behavior. Positive and negative comments stated for each design intervention is listed in detail in Appendix H. Most prominent findings are discussed in this part.

It was found that strategies such as rewarding and facilitating personal opinion were perceived as most effective strategies. It would be wrong to arrive at a definitive conclusion and claim that these strategies will always be effective. As stated several times throughout this thesis, there are many other factors that have an impact on the effectiveness of design interventions. However, it would be safe to say that some strategies are favored over others.

The results indicate that the way that a strategy is applied is as important as the strategy itself. Design interventions B and I adopt the similar strategy and offer rewards. However, product B was perceived as the most effective amongst all others and product I was perceived as the second least effective one. This contradiction has several possible explanations: (i) product I's reward function was not linked with the desired behavior. This was often criticized by participants. (ii) Product B was found visually appealing whereas product I was rated negatively on its visuals. (iii) Hygiene concerns were stated towards product I whereas no such criticism was expressed for product B.

The highest standard deviation value was found for product F. This finding indicates that Product F was the most controversial intervention and people had varied opinions about it. It can be speculated that the reason for this is personal norms. Product F was a campaign that was based on shaming people who litter. Participants who possessed ethical norms against the intervention most probably rated this

intervention very negatively. On the contrary, participants who did not have strong norms in this regard most likely found this intervention very effective.

4.5.3 Discussion of the requirements for designing effective interventions: Fundamentals and Considerations

Design interventions often deviate from their conventional counterparts for the sake of persuading users to certain behaviors. They may differ in color, shape, size or material; therefore they may end up looking like something else (like a basketball hoop in product D) or something totally new (like two large transparent containers in product G). Consequently, the first thing a user should do is to find out what the product is and how it functions. Therefore, appearance of design interventions is a factor to consider. In this regard, affordances (Gibson, 1979) were found to be helpful to clarify products functionality and usage. Affordances indirectly contribute to a product's ability to persuade users by making the usage easier.

The problematic behavior should be analyzed rigorously to reveal underlying reasons that cause it to occur. For this case, one of the reasons for the littering behavior is most likely the people's desire for convenience. People would like to get rid of their litter as soon as possible and as quick as possible. Therefore, people often do not bother with looking for a trash bin instead; they discard their litter right away. If this is the situation, the design intervention should be clear in its functionality and usage, easy to use and noticeable.

In this regard, design interventions can be seen as *triggers* as stated in the FBM (Fogg, 2009). The literature research showed that, although people think that keeping the environment clean is the right thing to do, they may still litter if this norm is not activated (R. B. Cialdini et al., 1990; Kallgren et al., 2000). During the research, it was observed that products have the potential to activate norms supporting both FBM and norm activation theory.

CHAPTER 5

CONCLUSION

This chapter sums up the thesis and reflects on the research findings. Then, it discusses the possible implications for researchers and practitioners. After that, it explains the limitations of the research and makes suggestions for further studies. The chapter ends with final remarks.

5.1 Reflecting on the Research Questions and Main Findings

It is a fact that products have an effect on human behavior. There is a considerable amount of knowledge in the literature, dedicated to understanding how to use products to persuade users to act in a desired way. However, human behavior is complicated and each behavior requires a different approach. The current study revealed various strategies and dimensions of persuasion towards prosocial behaviors, littering behavior in particular.

In order to communicate research findings clearly, each research questions is explained along with their corresponding results.

How should the design interventions be for encouraging prosocial behavior in littering?

In order to answer this research question, an evaluative study was conducted. Participants were asked to evaluate nine existing products based on the personal construct theory. This evaluation resulted in a list of design related dimensions, which will help designers to come up with more effective design interventions.

Research findings are summarized under the following sub-questions:

What are the dimensions of encouraging prosocial behavior in littering?

It is important to understand users perspective when applying persuasive designs. Existing literature falls short when it comes to understand the effects of persuasive designs on users. This research showed that there are a several dimensions that designers should consider when aiming for behavior change. These dimensions were grouped under three categories: fundamentals, considerations and strategies.

The research revealed dimensions that each product has to have in order to be effective. These dimensions were called the fundamentals (Table 5). The fundamentals are related to a product's overall understandability, usability, noticeability and applicability. They are suggested as imperative requirements for a product to have a persuasive impact. Dimensions listed under this category will serve designers as a checklist to assess their persuasive designs.

Table 5. Fundamentals

Fundamentals	*Description*
Clarity of products function	Product's function, what it does, should be easy to identify.
Clarity of products usage	The usage of the product should be communicated clearly.
Ease of use	Gaps, openings and other key components should be easy to access.
Noticeability	Design interventions should be easily noticed.
Applicability	Resources and effort spent for the intervention should be worth of the achieved impact

The research revealed another set of dimensions, which was called the considerations. The considerations are not as vital as fundamentals but designers should keep them in mind in order to achieve the desired effect. The considerations will remind the designer about sensitive issues that may affect users' perception and overall experience. They will help designers to realize possible consequences of various persuasion strategies in advance and minimize unexpected outcomes.
The considerations are summarized in Table 6.

Table 6. Considerations

Concerns	*Description*
Discrimination	Discriminating messages need to be avoided.
Privacy	Users' privacy needs should be taken into account.
Reliability	Products should be dependable and consistent considering its functions.
Preventing Misuse	Misuse like vandalism should be avoided.
Sustainability	Design interventions that aim to change environmental behavior should be sustainable themselves.
Visual Appeal	Design interventions should be visually pleasurable.
Attractiveness	Design interventions should attract users' attention.
Hygiene	Design interventions should make users feel comfortable considering personal hygiene.
Forcefulness	Design interventions should not be too coercive so that they do not cause frustration.

Which strategies can be used to persuade users towards prosocial behavior?/ What are the strengths and weaknesses of design intervention strategies?

In order to answer this question, strategies were derived from the evaluation of existing design interventions. Nine strategies were identified in total. Seven of these strategies have already been suggested in the existing literature. Therefore this study supports the findings of previous researchers. The current study contributes to the existing knowledge by suggesting two novel strategies: evoking old memories and facilitating personal opinion. An overview of all strategies can be found in Table 7.

Table 7. Strategies

Strategies	***Description***
Gamification	Game-like experiences can trigger users to act in a desired way.
Promote Competition	Users may behave in a certain way to compete with others.
Evoke Curiosity	Including design elements that make people curious may trigger them to act in a certain way.
Facilitate Personal Opinion	Offering a platform which enable users to express their ideas can be a motivator.
Evoke Old Memories	Reminiscent elements may create a positive attitude towards an action.
Rewarding	Interventions that offer personal benefits motivate people.
Inform about consequences	Providing information about positive or negative consequences may change user behavior.
Elicit empathy	Making users look at a situation from someone else's perspective may motivate them.
Shame	Users may change their behavior if they feel guilty.

The research showed that strategies like “rewarding” was perceived as the most effective intervention compared to the rest. On the other hand, a product which uses “elicit empathy” as the strategy was perceived as the least effective intervention. Although the perceived effectiveness of introduced strategies give an idea about users’ preferences, the effectiveness of these strategies are dependent on various other dimensions such as the ones stated in this research.

5.2 Design Implications

The outcomes of the current research contain useful information for both design researchers and design practitioners.

Contribution of designed artifacts to social problems is a popular topic within the current design research. Scholars are aiming to extend the current knowledge on this topic [7]. This study introduces the utility of personal construct theory to the field of persuasive design. The outcomes of the research shows that using personal construct theory in conjunction with triadic elicitation method has a potential to discover new design related dimensions and strategies.

The current study also contributes to the existing literature by suggesting new design strategies and a list of considerations on behavior change in littering. This newly acquired knowledge has the potential to be studied and iterated in further studies.

The study presents an overview of key points that a designer should consider when designing to change people’s behavior for the benefit of the society. Design for behavior change is a perplexing task. At the beginning of each project, designers will likely look for a starting point for their projects. The list of strategies presented in this study will serve as guide to ease the design process. Furthermore, various dimensions will help the designer assess their work in early stages of the design process.

[7] For example What Design Can Do (WCDC) conferences.

5.3 Recommendations for Further Research and Limitations

The current study aimed to capture design related data through the evaluation of existing products. These products were presented on printed media, therefore the study was limited with perceived experiences. However, in order to come up with more definitive results, the research should be conducted with actual products to observe the actual user experience. Similarly, using visual representation of products failed to capture the contextual factors. The effects of contextual factors are another field that is open for further study.

This research was focused on littering behavior and prosocial behavior in general. Although its outcomes can be applied to other persuasive studies as well, different behaviors may require different approaches. Therefore, studying other behaviors can reveal more dimensions, increasing the overall knowledge in persuasive design.

This study derived strategies and dimensions through the evaluation of existing design interventions. As a result, the exploration space was limited with the qualities of the selected products. A similar research with an extended product pool or with different products is recommended.

During this research, long term effectiveness of design interventions emerged as a potential research question for further study. Some design interventions have a long lasting impact on user behavior, whereas other interventions only change user behavior for a very limited amount of time. Qualities of these different interventions are open for future research.

The sample group recruited for the research represents a section of a specific population. However, it is suggested that age, education level and socio-economic status are all affecting factors of prosocial behavior. People from different backgrounds may indicate different concerns than the ones found in this research. Similarly, culture is a strong determinant as well. Different cultures possess different social norms, which have a significant impact on prosocial behavior. For these

reasons, a follow up study is recommended to unveil the dynamics of different communities that will require individual persuasion strategies.

As final remark, persuading users to change their behavior through design is not an easy task. If we were to assume that there is a mathematical formula for this task, this would be a quite long one with a lot of variables. Furthermore, not all of the variables have been discovered yet. There can be an infinite amount of them out there. Nevertheless, it is obvious that the more variables we discover and place in the formula, the more accurate results we will receive.

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APPENDIX A

INTERVIEW QUESTION SHEET

Röportaj Soruları – Pilot Çalışma

Mert Tosun 25/10/16

Birinci Bölüm

Giriş Kartlara basılı 12 ürün katılımcıya tanıtılır. Her seferede 3 adet kart kullanıcıya gösterilir;

Soru:

Gördüğünüz ürünlerden hangi ikisi diğerlerinden farklı?

Probing soruları:

.... olması iyi mi kötü mü? .... olması senin için neden önemli/ne ifade eder? .... olmasını ne sağladı?

İkinci Bölüm

Sizce bu ürünlerden hangileri davranışınızı değiştirmede daha etkili olur? Ürünleri soldan sağa **"etkili"**den **"etkisiz"**e doğru sıralayabilir misiniz?

APPENDIX B

PRODUCT EXPLANATIONS

Ürün A

İçinde bir sensör bulunan çöp kovası içine bir çöp atıldığında çok derin bir çukura atıl mış bir obje sesi çıkıyor. Üzerindeki yazı İsveççe'de "Dünyanın en derin çöp kovası" anlamına geliyor.

Ürün B

Avustralyada kullanımda olan bu sistemde insanlar cihaza attıkları geri dönüştürülebilir ambalajlar karşılığında bir takım sosyal etkinliklerde kullanabilecekleri indirim kuponları kazanıyorlar.

Ürün C

Çöp kovası ile tetris benzeri bir oyun oynanan bir çöp kovası.Üst sırada kovanın etrafında beyaz bir parça dolanıyor. Çöp attıldığı sırada o parça nerede ise o hizadan aşağı bir tetris parçası düşüyor.

Ürün D

Basket potası şeklinde tasarlanmış bu çöp kovaları kullanıcıyı uzaktan çöp atmaya teşvik ediyor.

Ürün E

Londra'da kullanılan bu panoların orta bölgesinde yakın mesafeden görülebilen çarpılar var. İnsanların bu çarpılara sakızlarını yapıştırmaları sonucunda bir mesaj ortaya çıkıyor.

Bu portreler şehrin farklı noktalarındaki billboardlara asılıyor.

PRODUCT EXPLANATIONS (CONTINUED)

Ürün F

Hong Kong'da uygulanan bu çalışmada yerlerdeki çöpleri toplayan bir ekip bu çöplerden DNA numuneleri topluyor. Toplanan bu numunelerden özel bir yazılım ile bilgisayar ortamında etrafı kirletenlerin portreleri oluşturuluyor.

Ürün G

İki hazneli olarak tasarlanmış bu çöp kovasında insanlar çöpleri ile oy kullanıyrolar. Burada need more time / need more money yazılı ancak aynı fikirle ünlü fotbolcu ya da şarkıcıları oyladığınız versiyonları da mevcut.

Ürün H

Resimlerde görülen çöp kutuları gündelik işler ile uğraşan bellboy, kahya, hizmetçi kıyafetlerini andırır şekilde giydirilmişler.

Ürün I

Bir alışveriş merkezinde bulunan geri dönüşüm ünitesi yukarıdaki boşluklardan elinizi soktuğunuz takdirde elinize dezenfeksiyon sıvısı püskürtüp sonrasında sıcak hava üfleyerek elinizi kurutuyor. Dezenfeksiyon özelliği için elinizi uzatmanız yeterli, çöp atmak zorunda değilsiniz.

APPENDIX C

TRANSLATION OF PARTICIPANT QUOTES

[01]: *"Bunu ilk bakışta anlayıp görür görmez basket atar gibi çöpünü atmaya çalışırsın."* (P04 on product D)

[02]: "Burada yazı olmasa, okumayı bilmeyen ya da anadili buradaki olmayan bir turist için bir şey ifade edeceğini düşünmüyorum. O takdirde normal bir kutudan öteye gitmeyecektir."

[03] "Bir de ben atıyorum ki ingilizce bilmiyorum. Yurt dışında bunu gördüğümde bankamatik filan sanabilirim." (P13 on product B)

[03]: "Ben bazen hiç bir anlam veremediğim çağdaş sanat eserlerine rastlıyorum. Bu da onlardan biri olabilir diye düşünebilirim. Çok hakim olmadığım bir konu olduğu için zarar vermek istemem." (P15).

[04]:Herkesin gidip normal çöpünü buraya atacağını düşünmüyorum. Çünkü cihazı biraz daha komplike hale getirdiğin zaman insanlar atmaya çekiniyor. Tabi kültür farklılıkları da olabiliyor. Bunun önüne geldiği zaman bir düşünecek. Okumaya başlayacak, burada bir yönderge var mı. Benden neyi bekliyor? Buradaki deliklerin amacı ne? Bunları sorgulayacaktır. (P12 on Product I)

[05]. ... şu anki algım buraya elimi sokmam. Böyle bir şey gördüğümde kafamda oluşacak ilk şey bunun içi zaten pistir. Ama üstünde bişey yazsa, bu işte 5sn'de şu kadar temizliyor. O pisliği de alıp götürüyor, size tekrar gelme ihtimali yok gibi bir şey yazsa. (P02 on product I)

[06]: Mesela buraya ne atmamızı istiyor? Bu çok belirsiz. Pet şişe mi atacağım Kağıt mı atacağım? Sadece çöpse ben buraya rastgele çöpümü de atabilirim. İlk gören insan için burada bir bilgilendirme eksiği var (P04 on product G).

[06]: I wonder what does it [the trash bin] expect to throw in here? This is unclear. Will I throw pet or paper? If it is not specified, I can throw my any kind of trash in here. I think there is a lack of information for the person who sees it for the first time (P04 on product G).

[07]: The guidance [of the trash bin] is very nice. The spot for throwing trash is painted hugely (P04 on product B)

[08]: "Bu baya yüksek gözüküyor. Benim boyum yetişir mi bilemedim. Ya da bir şey atarken dökülür mü acaba? Çayımı atacağım mesela, az kalmış dibinde..." (P15 on product G)

[09]: "Bir de delikleri çok ufak ufak. Kimse uğraşmaz bizim ülkemizde böyle şeylerle." (P10 on product I)

[10]: "Mesela bunu üzerinde teenage'leri ve gençleri görüyorum bunun üzerinde. Ama yaşlı birini göremiyorum. Bir kere bariyer var, yukarıya çıkmalarını isteyen bir şey var orada. Fiziksel olarak zorlanabileceklerini düşündüm" (P01 on product G)

[11]: "Yani herkesin elini soktuğu yere neden elimi sokayım?" (P02 on product I)

[12]: Bu biraz daha şeffaf içi gözüken bir şey olsa konsept biraz daha iyi olabilirdi. Mesela bir sürü insan içine elini sokuyor olabilir. Hijyen açısından da düşündürtür. (P04 on product I)

[13] “Belki ben o gün dalgınım ve elimde çöp var. Belki bu ışık benim o an dalgınlığımı bozup o an kafamı kaldırıp bakmamı sağlayacak.” (P08 on product C)

[14]Bu bir kiosk, bu iş için tasarlanmış bir araç ve büyük bir şekilde orada duruyor. Onun varlığının farkındayım. (P08 on product B)

[15]: “Bu uygulanabilirliği zor bir şey ve zaman alan bir şey. Sonuçta her yerde bu kadar kolay sağlanamayabilir. Yerden çöp toplama adımı var, araştırılması adımı var. Çok aşamalı ve meşakatli bir şey.” (P09 on product F)

[16]: “Dünyada neler olup bitiyor.. O DNA'yı başka şeyler için incele.” (P15 ürün F)

[17] “Ama bunlar uzun vadede bir şey ifade etmiyor eğer bu çöp kovalarından her yerde yoksa.” (P03 Ürün A ve C)

[18]: “Ama her 100 kişiden biri çöp atan bir şehirdeysek o zaman anca işe yarar.” (P11 Ürün F)

[19]:Ben bunu yapmaktan zevk alırdım. Zevk alıp çöp atmak insanın hoşuna gitmeyecek bir şey olabilir. Ama ben buna çöp atarken zevk alabileceğimi düşünüyorum. Oyun oynuyorsun. Bir yandan çöp atıyorsun.” (P07 Ürün C)

[20]: “Diğer insanların işin içinde olması oyunu yavaşlatıyorsa, oyunun bir tarafını yavaşlatıyorsa bana rahatsızlık verirdi. Hemen sonucunu görmek istiyorum yaptığım bir şeyin.” (P01 Ürün C)

[21] “Bu tek başına oynanabilecek bir şey değil. 10 kişi gelip atıyor. İlla ki bir yerde ben bunu tek başıma oynamak isteyeceğim. Bunu tek başına oynayabiliyor olsam daha anlamlı olurdu.” (P11 Ürün C)

[22] “Bunda, gördüğüm pet şişeyi sıkıştırıp bunlardan birisine atmayı deneyebilirdim. Hatta girmezse tekrar deneyebilirdim.” (P05 Ürün D)

[23]: Ben tetrisi çok hızlı oynayan bir insandım. Sürekli tuşlarını kullanarak hızlı hamleler yapmaya çalışırdım. İyi de rekorlarım vardı. Şimdi burada tetristen beklentimle uyuşmayan bir durum söz konusu. Beni sinir edebilir öyle bir şey.” (P01 Ürün C)

[24]: “Atacağın çöp kıymet kazanıyor. Elimdeki çöp ile ben burada bir şey yapabiliyorum diyorsun. O an için o çöp senin için işlevsel bir obje haline geliyor.” (P04 on product C)

[25]: Bizde bir oyun dürtüsü var ya kopamıyoruz. Makineler filan da var 1 lira atıp oynuyoruz. Bu, o makinelerin aynısı, sadece çöp atarak bu oyunu burada oynayabiliyorsun mesela. Oyunun getirdiği "bu sefer yapacağım, şimdi olacak" şeyi ile bu daha dikkat çekici. (P13 on product C)

[26]: 3 5 kişi gidip bunun yarışmasını da yapabilirler mesela. O açıdan bakınca insanları toplu olarak çekebilecek bir şey olarak da bunu farklı gördüm. (P09 on product D)

[27]: “Bunu ben kesinlikle denerim. İçindeki bütün ödülleri bulucam diye 10 kere 20 kere atabilirim. Bunu bekleyip de buna atabilirim. Sonucunu bir göreyim diye. İçinden indirim kuponları çıkacak ve ben onları merak ediyorum.” (P02 on product B)

[28]: Bunda da (G) sürekli farklı ikililerle oylamalar yaptığın zaman insanları kesinlikle çöp atmaya teşvik edecek bir şey olabilir. Mesela bir Fenerbahçe Galatasaray oylaması olsa sırf Fenerbahçeli olduğum için oraya atabilirim. Bu çöp toplamada çok daha etkin bir çözüm olabilir. (P02 on product G)

[29]: “Seçimlerden önce Trump ve Hillary Clinton diye yapılsa süper bir sosyal deney olabilir. Bu çok ucu açık bir şey, çok güzel yerelere çekilebilir.” (P13 on product G)

[30]: *Bu da sanki bir okul şeyiymiş gibi geliyor bana. Çocuklarda merak uyandırmak istersin ya... Bulmacalar gibi çözdüğümüz. Küçükken böyle noktaları birleştiriyorduk ya. Onu anımsattı bana. Aslında çocukluktaki anılarımızı şey yaparak da bilinçaltını uyandırmaya çalışıyor olabilir. Bu güzel bir yöntem.* (P10 on product E)

[31]: Burada bir ürünü kullanıyorsun ve çöpe atınca sana alacağın başka bir üründe bir seçenek sunuyor. Böylece ekonomik anlamda bir rahatlık sunuyor. Şu ürünü 1 tlye alıyorsun , bir sonraki üründe 50 kuruş veriyorsun mantığı ekonomik anlamda rahatlatacak bir şey. (P07 on product B)

[32]: “*Bir çok kişi "parası neyse veririz" kafasında da olabilir. Adamın sinemaya gitme planı var ve belki bu kioskun karşı kaldırımından yürüyor. Adam karşıya geçip şişeyi atacak oradan kuponu alacak filan. Bunu tüm bu efora değer görmeyebilir.”* (P08 on product B)

[33]: “Ama bu ikisi daha çok bilgilendirici yönüyle insanları ikna etme yönüne gidiyor. İnsan ne kadar yaptığı şeyin zararlı olduğu konusunda bilgilenirse o kadar az yapmaya çabalar bana göre.” (P07 on products E & H)

[34]: Burada verdikleri bilgilendirmede, sizin attığınız sakızları 56 milyon pounda biz sokaklardan temizliyoruz. Yani siz ne kadar az sakız atarsanız size o kadar dönüş yapacağınız bu parayla gibi bir şey algılanabilir. (P07 on product E)

[35]: “Burada mesela denebilir ki; 56 milyon pound bir milyon işsizin yemek ihtiyacını karşılayabilir. Yani yine rakam verilebilir ama somut bir örnek olabilir.”(P12 on product E)

[36]: “Bunu şimdi görünce bile beni etkiledi gerçekten. Çöpünü yere atarsan bunları kimin topladığının da bilincinde ol gibi bir mesaj veriyor bence.” (P05 on product H)

[37]: “Bence bir sorunu çözmede bu şekilde fişleme, ifşa etme, korkuyla bir şeyi baskılayarak çözmeye çalışmak bence etkili bir çözüm değil.” (P08 on product F)

[38]: Bu sanki meslekleri birbirinden ayırır gibi. Neden bir pilot ya da doktorun üniforması yok da bir bellboy'un ya da bir temizlikçinin üniforması var? Bu meslekleri yapan insanları bunu yanlış anlayabilir ve toplumun bazı kesimlerine zarar verebilir. (P06 on product H)

[39]: “Bence çöp atarken göz önünde olmak kötü birşey. Zaten çöpün atılıyor olması lazım. Bunun için insanların seni izlemesine gerek olmaması lazım. Zaten çöpünü normal olarak çöpe atıyor olman lazım.” (P02 on product G)

[40]: Burada insan sigarayı beklerken düşürmüş de olabilir. Çöp izlenimi yaratacak herhangi bir şey düşürmüş olabilir.

[41]: Çok sağlık bakanlığı gibi duruyor. Sanki bunu bana yaptırmaya çalışan devletmiş gibi hissettiriyor. Gizli bir devlet baskısı oluşuyor üzerimde. (P01 on product I)

[42]: “Neden ellerimi herkesin elini soktuğu yere sokayım??”

D

APPENDIX D

PERCEIVED EFFECTIVENESS SURVEY RESULTS

	A	B	C	D	E	F	G	H	I
P1	2	5	2	5	3	1	4	1	4
P2	3	4	3	2	5	5	4	2	1
P3	3	3	2	4	5	5	2	1	4
P4	3	5	3	3	2	1	5	1	2
P5	2	4	3	3	1	5	3	4	5
P6	3	5	4	5	2	1	3	1	3
P7	3	4	3	1	2	5	4	2	3
P8	3	2	4	3	1	2	2	1	1
P9	3	5	4	4	3	5	3	1	2
P10	5	5	5	4	3	4	4	2	1
P11	2	5	3	2	1	1	2	2	3
P12	3	4	4	1	4	5	5	2	2
P13	4	5	5	3	1	5	5	4	2
P14	3	4	5	4	3	5	5	1	2
P15	4	3	4	2	1	1	5	1	1
	3,06666667	4,2	3,6	3,06666667	2,46666667	3,4	3,733333	1,73333333	2,4
st dev1	0,79880864	0,94112395	0,98561076	1,27988095	1,4074631	1,91982142	1,16291915	1,03279556	1,24211801

APPENDIX E

HIGH RESOLUTION IMAGES OF DESIGN INTERVENTIONS

HIGH RESOLUTION IMAGES OF DESIGN INTERVENTIONS (CONTINUED)

HIGH RESOLUTION IMAGES OF DESIGN INTERVENTIONS (CONTINUED)

HIGH RESOLUTION IMAGES OF DESIGN INTERVENTIONS (CONTINUED)

HIGH RESOLUTION IMAGES OF DESIGN INTERVENTIONS (CONTINUED)

APPENDIX F

INFORMED CONSENT FORM

ARAŞTIRMAYA GÖNÜLLÜ KATILIM FORMU

Bu araştırma, ODTÜ Endüstri Ürünleri Tasarımı Bölümü Yüksek Lisans öğrencisi Mert Tosun tarafından Yrd. Doç. Dr. Gülşen Töre Yargın ve Dr.ir. Nynke Tromp danışmanlığındaki yüksek lisans tezi kapsamında yürütülmektedir. Bu form sizi araştırma koşulları hakkında bilgilendirmek için hazırlanmıştır.

Çalışmanın Amacı Nedir?

Araştırmanın amacı, sosyal problemleri çözmek amacıyla tasarlanacak ürünler hakkında tasarımcılar için yol gösterici bilgilere ulaşmaktır. Araştırma kapsamında sosyal problem olarak çöp atma davranışı seçilmiştir.

Bize Nasıl Yardımcı Olmanızı İsteyeceğiz?

Araştırmaya katılmayı kabul ederseniz, yaklaşık olarak bir saat sürmesi beklenen bir röportaj seansına katılmanız beklenmektedir. Bu seansta sizlere bir dizi ürün sunulacak ve bu ürünler hakkındaki fikirleriniz sorulacaktır. Daha sonra içerik analizi ile değerlendirilmek üzere seansın ses ve görüntü kaydı alınacaktır.

Sizden Topladığımız Bilgileri Nasıl Kullanacağız?

Araştırmaya katılımınız tamamen gönüllülük temelinde olmalıdır. Çalışmada sizden kimlik veya kurum belirleyici hiçbir bilgi istenmemektedir. Cevaplarınız tamamıyla gizli tutulacak ve sadece araştırmacılar tarafından değerlendirilecektir. Katılımcılardan elde edilecek bilgiler toplu halde değerlendirilecek ve bilimsel nnyayınlarda kullanılacaktır.

Katılımınızla ilgili bilmeniz gerekenler:

Çalıştay, genel olarak kişisel rahatsızlık verecek sorular veya uygulamalar içermemektedir. Ancak, katılım sırasında sorulardan ya da herhangi başka bir nedenden ötürü kendinizi rahatsız hissederseniz çalıştayı yarıda bırakıp çıkmakta serbestsiniz. Böyle bir durumda çalışmayı uygulayan kişiye çalışmadan çıkmak istediğinizi söylemek yeterli olacaktır.

INFORMED CONSENT FORM (CONTINUED)

Araştırmayla ilgili daha fazla bilgi almak isterseniz:

Röportaj sonunda, bu çalışmayla ilgili sorularınız cevaplanacaktır. Bu çalışmaya katıldığınız için şimdiden teşekkür ederiz. Çalışma hakkında daha fazla bilgi almak için Endüstri Ürünleri Tasarımı Bölümü öğretim üyelerinden Yrd. Doç. Dr. Gülşen Töre Yargın (E-posta: tore@metu.edu.tr) ya da yüksek lisans öğrencisi Mert Tosun (E-posta: mr.tosun@gmail.com) ile iletişim kurabilirsiniz.

Yukarıdaki bilgileri okudum ve bu çalışmaya tamamen gönüllü olarak katılıyorum.
(Formu doldurup imzaladıktan sonra uygulayıcıya geri veriniz).

İsim Soyad Tarih İmza

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APPENDIX G

ANALYSIS SHEET OF THE SECOND CYCLE CODING PROCESS

Construct	Product	Product Attribute	Participants
Product's function	A G	Product does not give information about it's function	P04, P14
	A B	Product does not have a global language	P12, P13
	I	Product does not look like a trash bin	P03
	C D H I	Product gives visual clues about it's purpose	P03, P12
	I	Product has a complex interface	P12
	A C D H G	Product has a similar form to a conventional trash bin	P02, P11, P13
	A D	Product has a simple look	P03
	D	Product is associated with a well known sport	P04
Product's usage	G	Product does not instruct about the trash type	P04
	B E	Product gives short and clear instructions	P04
	B	Product gives sufficient instructions	P04
	I	Product has a complex interface	P12 P15
	E I	Product has an extensive list of instructions	P04, P15
	D	Product is associated with a well known sport	P04
	I	Product's benefits and usage are described clearly	P02
	B	Product's purpose is written down in large text	P01, P04
Ease of use	G	Garbage opening is too high	P02, P08, P15
	A I	Garbage opening is too small	P01, P10, P13, P15
	G	High platform forms a physical barrier	P01, P10
	A	Garbage opening is not accessible	P01
Hygienic	D	Having openings which may cause leakage	P02
	E	Interacting closely with someone elses garbage	P01, P14, P15
	I	Touching an area which is frequently touched by others	P02, P14, P15
Noticeability	A	Having bright colors	P01
	C H	Product has lights	P08, P09
	B I	Product is large in size	P08
	E H I	Product is not noticeable enough	P11, P13, P14
	D	Users of the product can attract other people	P09
Applicability	A C G	Product needs to be widely available to be effective	P03, P08
	G	Product requires a low cost and effort but achieves a lot	P04, P11
	A B C F	Product requires high cost and effort	P02, P03, P08, P11, P14, P15

ANALYSIS SHEET OF THE SECOND CYCLE CODING PROCESS (CONTINUED)

	F	Product's effectiveness depends on social norms	P11
Discriminating people	H	Associating a trash with an occupation	P01, P04, P06, P10, P12, P15,
	H	Associating trash with human body.	P01
Privacy		Making user stand out	P01, P02, P08
Decreasing Reliability	F	A person may accidently drop something as opposed to littering intentionally	P10, P11, P12
	F	Faces of people who litter can not be identified in detail	P06, P13, P15
	F	Product may direct wrong accusations	P10
Risking Security	A	Trash is not visible from the outside	P01
	G	Trash is visible from the outside	P01
Prevent misuse	I	Disconnection between the reward and action seems irrational	P13, P14
	I	People can get personal benefit wihout performing the desired behaviour.	P05, P08, P10, P11
	F	People may get frustrated which will cause an increase in littering behaviour	P06
	E	People may not use it according to instructions and cause undesired outcomes.	P05, P15
	F I	Product may be used for entertainment purposes	P01, P02, P12
	D	Unability to persuade the user to put the garbage inside, when s/he misses the target	P01, P4, P05, P13, P15
Sustainability	H	Product is made of perishable materials	P11, P15
	C	Product requires high amount of energy to function	P01, P02
Visual appeal	B E	Colors used on the product are appropriate	P04, P05
	I	Colors used on the product does create a clean feeling.	P15
	I	Device has a bulky form	P04
	I	Fonts used on the product are ugly.	P04
	B	Graphics and colors of the product are simple and appealing	P01
	I	Product has a complicated look	P01, P15
	G	Product has a simple shape.	P04
	I	Product hides the bad look of trash	P08
	E	Product is in harmony with its environment	P03
	B	Product is made of neat materials and finishings	P04

ANALYSIS SHEET OF THE SECOND CYCLE CODING PROCESS (CONTINUED)

	G	Product is made of transparent materials	P04
	G	Product is made of transparent materials	P04
	I	Product looks like cheap devices at public places	P04
	H	Product makes the environment more aesthetic	P03, P11, P13
	B	Products colors are too alerting	P03
	D	Trash is visible from the outside	P02
	I	Visual elements on the product looks primitive	P01
Attractiveness	A C	Product emits sound	P02, P03, P08, P09
	C	Product has a game-like interaction	P04
	F	Product has a human face on it.	P08
	D	Product has a resemblence to a sports game	P02, P05, P06, P14
	A E	Product has dull colors	P01, P15
	C	Product has lights	P02, P08
	B C	Product has technological parts - interface	P02, P04, P13
	E F	Product informs people in a striking way	P01, P03, P13
	C	Product is colorful	P02
	A	Product is similar to a conventinal product	P04
	B	Product is similar to a conventinal product	P12
	E	Product looks like an ordinary poster	P12
	A	Product plays the same sound effect each time	P02, P03, P04
	G	Product requires a hard physical task	P02
	G	Product reveals other peoples opinion	P04
	G	Products content is updated regularly	P04
Forcefulness	B	Colors on the product reminds road or construction signs.	P03
	F	People who throw trash are exposed publicly	P14
	F	People who throw trash are exposed publicly	P05, P06, P15
	F	Product collects personal information without consent	P13
	F	Product makes people feel that they are being watched	P04
	D	Product does not enforce anything whether a person throws his/her trash correctly or not.	P03
	B	Product forces people to learn something	P03

ANALYSIS SHEET OF THE SECOND CYCLE CODING PROCESS (CONTINUED)

	F	Product imposes a behaviour which may cause undesired outcomes.	P04
	E F	Product intimidates people about consequences of their actions	P02
	F	Product intimidates people about consequences of their actions	P07
	F	Product intervenes other peoples freedom	P04
	B I	Visuals on the product reminds governmental institutions	P01, P03
Game-like interaction	C	Gaming experience offered by the product does not match with users prior experience	P01
	C	Multiple players can play the game	P01, P11
	C	Product asks user to complete something	P03
	A	Product emits sounds	P14
	D	Product has a resemblance to a sports game	P05, P11, P12, P14
	C	Product has colorful elements, resembles an interactive child game	s
	B C D E	Product motivates people to adopt prosocial behaviour through a game	P02, P06, P09, P10
		Product turns trash into a game element	P02, P04, P05, P07, P09, P13
Competition	C D	Multiple players can play the game	P06, P07, P09
	G	Product is asking for peoples opinon on a popular subject	P02, P05, P09
	C	Product triggers peoples desire for achievement	P13
Curiosity	A B C E	Product asks user to complete something	P06, P07 P10, P12, P14
	A	Product emits sounds	P07, P08
	C	Product has a game-like interaction	P05, P06
	A E	Product has an intriguing text on it	P05, P06, P09, P10
	C	Product has lights	P04
	B I	Product has technological parts - interface	P02
	B	Product offers various rewards	P02
	G	Product reveals other peoples opinion	P05
Facilitating personal opinion	G	Product is asking about a political topic	P13
	G	Product is asking about a political topic	P15
	G	Product is asking for peoples opinon on a popular subject	P01, P08, P09, P10, P11, P12, P14
	G	Product is enabling people to support their opininon	P04, P05, P07, P14, P15

ANALYSIS SHEET OF THE SECOND CYCLE CODING PROCESS (CONTINUED)

	D G	Product makes people think about a topic	P06, P10, P15
Evoking old memories	C D E	Product resembles a childhood game	P02, P08, P10
Rewarding	B I	Product offers an economic benefit	P01, P02, P04, P05, , P06, P07, P08, P09, P10, P11, P12, P13, P14
	I	Product offers hand sanitizer	P01, P03, P05, P06
	B	Product offers something functional	P15
Informing about consequences	E	Product informs people about how much money spend as a result of their action	P02, P03, P06, P07, P08, P13, P14
	E H	Product informs people about the harms of their actions	P07
	E	Product informs people about the impact of their action on the environment	P06
	E	Product informs people in a memorable way	P09
	E	Product informs people in a striking way	P13
	E	Product uses a formal manner to communicate its intent	P06
	F	Product warns people about wrong behaviour and intimidate with its consequence	P09
Giving concrete example	E	Product informs people by only using numerical value	P02, P04, P11, P12
		Products output only benefits a single person	P02
Appreciating the Effort	E	Product explicitly attempts to change behaviour	P01
	B	Product has technological parts - interface	P02, P08
	B F	Product requires high cost and effort	P08, P11
Elicit empathy	E	Product makes people to think about wasted resources and people in need	P02
	H	Product reminds of people who cleans the environment	P05
Shame - Humiliation	F H	People who throw trash are exposed publicly	P02, P05, P07, P08, P09 P10, P12
		People who throw trash are exposed publicly	P02, P07,P08, P10
Motivating long term interaction	B F G	Interacting with product provides results	P02
	B E	Product asks user to complete something	P09, P15
	A C E	Product repeats the same response eveytime	P01, P02, P04, P05, P06, P09, P10, P11, P15
	C	Product triggers peoples desire for achievement	P09

APPENDIX H

PARTICIPANT COMMENTS FOR EACH DESIGN INTERVENTION

Intervention A	
Positive	***Negative***
Product has a simple look	Product does not give information about it's function
Having bright colors	Product does not have a global language
Product emits sound	Garbage opening is too small
Product asks user to complete something	Garbage opening is not accessible
Product emits sounds	Product needs to be widely available to be effective
Product has an intriguing text on it	Product requires high cost and effort
	Trash is not visible from the outside
	Product has dull colors
	Product is similar to a conventional product
	Product plays the same sound effect each time
	Product repeats the same response every time

PARTICIPANT COMMENTS FOR EACH DESIGN INTERVENTION (CONTINUED)

Intervention B	
Positive	***Negative***
Product gives short and clear instructions	Product does not have a global language
Product gives sufficient instructions	Product requires high cost and effort
Product's purpose is written down in large text	Products colors are too alerting
Product is large in size	Colors on the product reminds road or construction signs.
Colors used on the product are appropriate	Product forces people to learn something
Graphics and colors of the product are simple and appealing	Visuals on the product reminds governmental institutions
Product is made of neat materials and finishing	
Product has technological parts - interface	
Product is similar to a conventional product	
Product motivates people to adopt prosocial behaviour through a game	
Product asks user to complete something	
Product has technological parts - interface	
Product offers various rewards	
Product offers an economic benefit	
Product offers something functional	
Product has technological parts - interface	
Product requires high cost and effort	
Interacting with product provides results	
Product asks user to complete something	

PARTICIPANT COMMENTS FOR EACH DESIGN INTERVENTION (CONTINUED)

Intervention C	
Positive	***Negative***
Product has a similar form to a conventional trash bin	Product gives visual clues about its purpose
Product has lights	Product needs to be widely available to be effective
Product emits sound	Product requires high cost and effort
Product has a game-like interaction	Product requires high amount of energy to function
Product has lights	Gaming experience offered by the product does not match with users prior experience
Product has technological parts - interface	Multiple players can play the game
Product is colorful	Product repeats the same response every time
Product asks user to complete something	
Product has colorful elements, resembles an interactive child game	
Product motivates people to adopt prosocial behaviour through a game	
Multiple players can play the game	
Product triggers peoples desire for achievement	
Product asks user to complete something	
Product has a game-like interaction	
Product has lights	
Product resembles a childhood game	
Product triggers peoples desire for achievement	

PARTICIPANT COMMENTS FOR EACH DESIGN INTERVENTION (CONTINUED)

Intervention D	
Positive	***Negative***
Product has a similar form to a conventional trash bin	Product gives visual clues about its purpose
Product has a simple look	Having openings which may cause leakage
Product is associated with a well-known sport	Inability to persuade the user to put the garbage inside, when s/he misses the target
Product is associated with a well-known sport	Trash is visible from the outside
Users of the product can attract other people	
Product does not enforce anything whether a person throws his/her trash correctly or not.	
Product has a resemblance to a sports game	
Product motivates people to adopt prosocial behaviour through a game	
Product makes people think about a topic	
Product resembles a childhood game	

PARTICIPANT COMMENTS FOR EACH DESIGN INTERVENTION (CONTINUED)

Intervention E	
Positive	***Negative***
Product gives short and clear instructions	Product has an extensive list of instructions
Colors used on the product are appropriate	Interacting closely with someone else's garbage
Product is in harmony with its environment	Product is not noticeable enough
Product informs people in a striking way	People may not use it according to instructions and cause undesired outcomes.
Product intimidates people about consequences of their actions	Product has dull colors
Product motivates people to adopt prosocial behaviour through a game	Product looks like an ordinary poster
Product asks user to complete something	Product informs people by only using numerical value
Product has an intriguing text on it	
Product resembles a childhood game	
Product informs people about how much money spend as a result of their action	
Product informs people about the harms of their actions	
Product informs people about the impact of their action on the environment	
Product informs people in a memorable way	
Product informs people in a striking way	
Product uses a formal manner to communicate its intent	
Product explicitly attempts to change behaviour	
Product makes people to think about wasted resources and people in need	
Product asks user to complete something	

PARTICIPANT COMMENTS FOR EACH DESIGN INTERVENTION (CONTINUED)

Intervention F	
Positive	***Negative***
Product has a human face on it.	Product requires high cost and effort
Product informs people in a striking way	Product's effectiveness depends on social norms
People who throw trash are exposed publicly	A person may accidently drop something as opposed to littering intentionally
Product intimidates people about consequences of their actions	Faces of people who litter can not be identified in detail
Product warns people about wrong behaviour and intimidate with its consequence	Product may direct wrong accusations
Product requires high cost and effort	People may get frustrated which will cause an increase in littering behaviour
People who throw trash are exposed publicly	Product may be used for entertainment purposes
Interacting with product provides results	People who throw trash are exposed publicly
	Product collects personal information without consent
	Product makes people feel that they are being watched
	Product imposes a behaviour which may cause undesired outcomes.
	Product intimidates people about consequences of their actions
	Product intervenes other peoples freedom

PARTICIPANT COMMENTS FOR EACH DESIGN INTERVENTION (CONTINUED)

Intervention G	
Positive	***Negative***
Product has a similar form to a conventional trash bin	Product does not give information about it's function
Product requires a low cost and effort but achieves a lot	Product does not instruct about the trash type
Trash is visible from the outside	Garbage opening is too high
Product has a simple shape.	High platform forms a physical barrier
Product is made of transparent materials	Product needs to be widely available to be effective
Product requires a hard physical task	Product is made of transparent materials
Product reveals other peoples opinion	Product is asking about a political topic
Products content is updated regularly	
Product is asking for peoples opinon on a popular subject	
Product reveals other peoples opinion	
Product is asking about a political topic	
Product is asking for peoples opinon on a popular subject	
Product is enabling people to support their opininon	
Product makes people think about a topic	

PARTICIPANT COMMENTS FOR EACH DESIGN INTERVENTION (CONTINUED)

Intervention H	
Positive	***Negative***
Product has a similar form to a conventional trash bin	Product gives visual clues about it's purpose
Product makes the environment more aesthetic	Product is not noticeable enough
Product informs people about the harms of their actions	Associating a trash with an occupation
Product reminds of people who cleans the environment	Associating trash with human body.
People who throw trash are exposed publicly	Product is made of perishable materials

Intervention I	
Positive	***Negative***
Product does not look like a trash bin	Product's benefits and usage are described clearly
Product gives visual clues about it's purpose	Product is large in size
Product has a complex interface	Product hides the bad look of trash
Product has a complex interface	Product has technological parts - interface
Product has an extensive list of instructions	Product offers an economic benefit
Product's benefits and usage are described clearly	Product offers hand sanitizer
Garbage opening is too small	
Touching an area which is frequently touched by others	
Product is large in size	
Product is not noticeable enough	
Disconnection between the reward and action seems irrational	
People can get personal benefit wihout performing the desired behaviour.	
Product may be used for entertainment purposes	
Colors used on the product does create a clean feeling.	
Device has a bulky form	
Fonts used on the product are ugly.	
Product has a complicated look	
Product looks like cheap devices at public places	
Visual elements on the product looks primitive	
Visuals on the product reminds governmental institutions	

APPENDIX I

NUMBER OF PERSONAL CONSTRUCTS STATED PARTICIPANTS

Participant	*Number of Personal Constructs*
P01	27
P02	34
P03	18
P04	34
P05	18
P06	17
P07	11
P08	21
P09	17
P10	16
P11	16
P12	15
P13	17
P14	15
P15	22