The Lovers’ Project: Designing for Personal Emotional Significance of Objects with Incorporated Technology - A Case Study

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List of Abbreviations

AttrakDiff™ Instrument to Measure the Attractiveness of Interactive Systems
CL Comparison Level
CLalt Comparison Level for alternatives
CORPUS Change Oriented analysis of the Relationship between Product and User
DRM Day Reconstruction Method
DVD Digital Video Disc
HCI Human-Computer Interaction
HQ Hedonic Quality
I Investments
INCOBI Computer Literacy Inventory
ISO International Standards Organization
O Outcomes
LED Light-Emitting Diode
PAIR Personal Assessment of Intimacy in Relationships
PQ Pragmatic Quality
RAS Relationship Assessment Scale
RD Reflective Design
RFID Radio-Frequency Identification
UCD User-Centered Design
UX User Experience
VECA Vertrautheit mit Computeranwendungen [Familiarity with computer applications]
VGA Video Graphics Array
XML EXtensible Markup Language
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Abstract

This work presents an empirical study of the explorable digital Lovers' objects, a wooden box and its key with incorporated technology, designed to engage romantic couples in reflections on their relationships. By adopting perspectives from both social psychology and interaction design the work aims to extend existing approaches to user-centered design by: (1) characterising fundamental human needs for intimacy and belongingness and its relevance to human-computer interaction, (2) exploring social interaction within romantic relationships through technology, (3) considering the potential of digital objects to be a site for enduring attachments of personal emotional significance, and (4) extending our understanding of user experience over time. On this, a case study was conducted, involving five couples in new relationships who were asked to exchange video messages (co-created with a digital media artist) of personally meaningful content using the Lovers' objects over a period of five weeks. Quantitative and qualitative results demonstrate the rich manner in which the Lovers' box became meaningful to participants, and demonstrate how the potential for new castings of digital objects might support our emotional lives.
1 Introduction

I bought a new mobile phone. I chose it because of its beautiful design, I love the color, it's very trendy. I was really excited to use it. Of course, I expected it to work well.

Now, I got used to it, but it's not as exciting and stimulating anymore. It feels like my old phone just a bit newer, I guess.

Even though the statements above are just fictional it is relatively easy to imagine a situation where something similar might be uttered. The statements are chosen to demonstrate three important aspects that are increasingly taken into account by current approaches and perspectives on human-technique interaction: (1) individuals' awareness of usability increased over the years. Customers expect products to be easy to use. They are less surprised and satisfied about a good functionality but frustrated and dissatisfied if difficulties and problems in use occur (Jordan, 1998; Jordan, 2000); (2) digital products bring not only functional benefits but also valuable emotional ones (Norman, 2004; Overbeeke et al., 2003; Karapanos et al., 2009). They might provide stimulation, impress through their aesthetic appeal, create pleasure or enable the communication of a favorable social status to others (e.g. that one is trendy) (Hassenzahl, 2003; Burmester et al., 2002). Emotions are relevant factors that influence customers' interaction with the product. Feelings not only shape our thinking (Khalid & Helander, 2006), but also our motivation to buy. However, emotional or hedonistic benefits of new consumer electronics as a beautiful design, innovativeness or through the stimulation they provide are in many cases just short-lived (Wallace, 2007). Thus, electronic products seem not only to lose their initial attractiveness through an increasing familiarity with them, but are also easily replaceable through newer versions of the same. It is therefore also important to take (3) the aspect of temporality into account, since the pragmatic and hedonistic qualities of digital objects might change over time (Karapanos et al., 2008; 2009; van Schaik & Ling, 2009; von Wilamowitz-Moellendorf, 2006; 2007). The presented aspects are in line with current trends in the field of user experience (UX). Many researchers in this area (e.g. Jordan, 2000; Blythe & Hassenzahl, 2003; Hassenzahl, 2001; Burmester et al., 2002; Kaptelinin & Nardi, 2006; Wright, Wallace & McCarthy, 2008; Sas & Dix, 2009) plead for more holistic views on HCI by emphasising qualities that go beyond traditional notions of usability, as it is for instance defined by the International Standards Organization (ISO DIS 9241, Part 11). Hassenzahl (2003) argues "that a product should not longer be seen as simply delivering a bundle of functional features and benefits - it provides experiences" (p.31). Equally,
Kaptelini and Nardi (2006) criticize that digital products are merely described with regard to their functionality rather than their meaning for the user, without paying due regard to individual needs or social contexts. We have therefore experienced a shift in HCI from avoiding usability problems to more human-centered design approaches that are mainly concerned with positive outcomes and experiences of human-technique interactions (Seligman & Csikszentmihalyi, 2000; Jordan, 1998).

This work can be seen as an attempt to meet the presented new and more holistic challenges in the field of HCI. Moreover, it gives an example of the development of digital technologies that are in fact able to address a wider view on human needs, as it aims to extend current assumptions of needs in HCI by defining the fundamental human needs for belongingness and intimacy that are essential in people's lives, and whose non-fulfillment has many potential negative consequences in the form of psychological pathologies, stress, chronic depression and further health problems (Guerrero & Anderson, 2000; Baumeister & Leary, 1995; Oberg, 2003; Grau, 2003; Smith & Mackie, 2007; Waring, 1984). These should be supported by, and addressed in issues in the design of digital objects, since they are essentially related to individuals' well-being (Doyal & Gough, 1984).

In this regard, intimate romantic relationships make valuable subjects in research as they do much to fulfill these essential human needs for intimacy and belongingness to a significant other, and can be seen as a rich source of individual experiences and emotions (Guerrero & Andersen, 2000). Thus, in the scope of the present project, four sets of explorable Lovers' objects (a special box and its key) with incorporated technology were developed and handed over to couples in romantic relationships to exchange digital messages with their partners over a period of five weeks. Through the Lovers' box the aim is to observe and better understand both the positive interactions with the significant other (the need to belong), but also the giving and receiving of intimate and emotionally significant messages of the beloved person (the need for intimacy). It is hoped with regard to the box's functionality that the created digital messages allow participants to reflect on and present themselves and their relationship. As such, the study also attempts to contribute to a better understanding of interpersonal interaction within new romantic relationships especially with regard to social exchange processes and communication behavior.

Beyond, the present work takes in particular the relationship between humans and digital objects into account. The phone example at the beginning shows that many consumer products are easily replaceable, since they are primarily seen as tools to fulfill certain tasks rather than 'living objects' that people can relate to (Hassenzahl & Tractinsky, 2006; Jordan, 2000). How might it be possible to create objects with incorporated technology that enable an enduring relationship to them, that can become important objects in ones' live and of individual worth? For that purpose, not only a bet-
ter understanding of humans and their experiences through the interaction with digital objects is needed, but rather a reconsideration of the rich potential of technology and of the wider roles it could play in peoples’ lives (cf. Olivier & Wallace, 2008). In the scope of the present work, it is therefore aimed to increase the meaningful presence of digital artifacts (Hallnäs & Redström, 2002). In this regard, the aesthetics of the design, and the nature of interaction with the Lovers’ objects is purposeful and designed to avoid conventional assumptions and expectations that might be associated with traditional consumer electronics. As such, the Lovers’ artifacts are constructed as open objects intended to be completed by participants’ own content, interpretations and meanings (cf. Senger & Gaver, 2006; Zimmerman, 2009; Gaver, Beaver & Benford, 2003). The key hope with regard to the Lovers’ objects is that they support subjects’ fundamental human needs, hence provide stimulation even over the long run, and, be it that participants share individual feelings about each other and the relationship through the objects, that these in turn become personal emotional meaningful to them. Aside, the present work also pays careful attention to issues of temporality and how UX changes over time. By going beyond an analysis exclusively based on couples’ initial interaction with the digital Lovers’ objects, it is sought to understand how for instance an increasing familiarity with them influences participants’ perception of the same, how the objects might be integrated in a routine of couples’ everyday lives, and which individual roles might be assigned to them over the course of use.

In summary, this work mainly attempts to: (1) characterize fundamental human needs for intimacy and belongingness and its relevance to human-computer interaction; (2) explore social interaction within couples in new romantic relationships via technology; (3) consider the potential of digital objects to be a site for enduring attachments of personal emotional significance, and (4) extend our understanding of user experiences over time.

The following theoretical part opens with an introduction of current approaches concerning human needs in HCI that provide the background to characterize the fundamental human needs for belongingness and intimacy. It continues Sternbergs’ prominent concept of love and its relevance for romantic relationships and gives a detailed overview about relevant social interaction theories. Relational changes over time are considered. Further, to allow objects with embedded technology to become personal emotional significant for the individual, the user experience model of Hassenzahl is introduced as well as approaches concerning reflection through design. The relevance of routines and an integration of digital objects in peoples’ everyday lives is respected. Moreover, studies relative to dynamics in user experience and their measurement are discussed. This chapter closes with a resume of the theoretical assumption, and the ensuing questions concerning the Lovers’ project.
2 Theoretical Background

2.1 Human Needs in HCI

This theoretical chapter starts with an introduction of the current state of human needs in HCI. In particular, the intimacy need will be presented as well as some technique-related projects in this regard. It continues with the definition of the more fundamental human needs for belongingness and intimacy.

2.1.1 Status Quo

When we talk about human needs in the scope of traditional HCI, the focus mainly lies on usability demands of products or systems and the user's requirements in this regard (Specker & Wentzla, 2007). Historically, research in this field has been dominated by concerns as to the achievement of behavioral goals in work settings, with the nature of a task being a designer's key concern (Hassenzahl & Tractinski, 2006). As such, digital technology has been regarded as a tool which at its best has appropriate functionality as well as a good usability. Inevitably, researchers and practitioners in interaction design are still heavily influenced by the concerns of the workplace assuming that technological devices have to cope with the information processing and communication challenges of our everyday lives (Olivier & Wallace, 2008). Even though Muller et al. (1997) proposed a research agenda based on human needs and social responsibility to outline new areas of potential growth for HCI, their focus was solely task-driven by enhancing the quality of interaction or enabling computer access for everyone. Following, usability - broadly described as quality of use (i.e., ease of use, free of error)- became more and more important over the years (Bevan 1995; Burmester et al., 2002). Although, a good usability is regarded as an additional product value that helps individuals to easily use digital objects or systems, the definition of the notion remains still vague (Hassenzahl, 2001). Most usability experts agree with the definition given by the International Standards Organization (ISO DIS 9241, Part 11), defining it as the "extent to which a product can be used by specific users to achieve specific goals with effectiveness, efficiency and satisfaction in a specified context of use". Although this definition is mainly goal- and task-oriented, usability as one of the most popular concepts in HCI increasingly encompasses subjective criteria such as user satisfaction (Tractinsky et al., 2000). Unfortunately, the term 'satisfaction' is reduced in this context to cognitive and physical components of human-technique interchanges, as it is about the comfort of interaction, and acceptability to which the product is a vehicle for achieving user's goals (e.g. minimized cognitive or physical demands; Jordan, 2000). Nevertheless, user-centered design (UCD) approaches could contribute to
much more than the avoidance of usability problems, and the enabling of a comfortable interaction. By way of example, people seek for products that are not necessarily easy to use, but rather "challenging, seductive, playful, surprising, memorable or even moody, resulting in enjoyment of the experience" (Overbeek et al, 2003, p.9). This becomes also apparent through an increasing interest in user experience research acknowledging an extra potential that digital objects might provide. Here, many HCI researchers (e.g. Gaver & Martin, 2000; Jordan, 2000; Wright et al., 2008; Olivier & Wallace, 2008; Hassenzahl, 2001; 2003; Burmester et al., 2002; Kaptelini & Nardi, 2006; Norman, 2004) have argued for a more holistic view that requires not only the consideration of cognitive or rational aspects of experiences, but also sensual and emotional ones.

Graver and Marin (2000) mention for instance that "digital devices might embody values apart from those traditionally associated with functionality and usefulness" (p.209). Tractinsky et al. (2000) propose that aside of usability aesthetics should be taken into account in creating pleasurable digital products. Further, Jordan (2000) proposes to regard digital products as "living objects with which people have relationships" (p.7, original emphasis). Likewise, Hassenzahl & Tractinsky (2006) as well as Karapanos et al. (2009) mention that further technologies should not just offer pragmatic qualities but also hedonic ones; like stimulation, identification and evocation of memories through the product or system (see also user experience model of Hassenzahl in Section 2.3.1). Thus, technological products might be valued for being fashionable, fascinating, enjoyable or challenging (Hudlicka, 2003). However, emotions should not be narrowed down to fun and enjoyment only (Overbeeke et al., 2003). New technologies for human computer interaction might enable the fulfillment of wider social and emotional needs as well; for example the enhancement of social contact, or a feeling of emotional closeness and warmth. Regarding Norman (2004) a good human-centered design should therefore be focused upon understanding and satisfying user's actual needs that go beyond a products' effectiveness and efficiency. Two dominant and more holistic approaches in this regard are presented in the following.

2.1.1.1 Emotion through Design: Norman's Three Levels

Regarding everyday products, Norman (2004) distinguishes three levels of emotional design: visceral, behavioral, and reflective. All three are equally important and shape our experience with the object of interaction.

At the visceral level, we receive emotional signals from our environment that we select with regard to sizes, colors and shapes. Good designs constitute for instance of symmetry, the golden ration, visual balances, or an appropriate use of colors and white spaces (Khalid & Helander, 2006). Based on these environmental signals we consider it's aesthetic value without thinking...
deeper about it. This level is therefore very basic, dominated by physical features as the look, feel and sound of products that shape our initial reaction (Norman, 2004; Reeps, 2004).

On the behavioral level, we don’t think about a product’s appearance, but about its function, usability (easy to learn, not error-prone, accessibility for everyone), understandability, and physical feel. According to Norman (2004), the "very first behavioral test a product must pass is whether it fulfills needs" (p.70), but people’s needs are complex, and neither easy to articulate nor easy to capture otherwise. To discover and understand people’s true needs, Norman proposes to carefully observe them in their natural environment. Found and fulfilled needs through product use can be seen as successful functionality, but a product has to be understandable as well. Mutual understanding is given on a conceptual level, if the mental model of the designer matches the user’s one (see further human action cycle; e.g. Norman & Draper, 1986). Feedback (audio, visual or haptic) might help to reduce gulls between these models. Beyond, the physical touch and feel of products matter since they are critical to our behavioral assessment of them. Tangibility of a product - as it possesses of a surface, texture, and weight - adds the pleasure to manipulate; combined with a sense of physical control (cf. Dourish, 2001). Norman (2004) criticises that the abstractedness of computer screens and virtual environments neglect natural and emotional pleasures that tangible real world objects provide. This position is also supported by Overbeeke et al. (2003), who recommend designers to consider people as human beings with rich senses, a body, and action potentials, and consequently, to reinstate the physicality of a product. Or, to say it in Norman’s words: "To be truly beautiful, wondrous, and pleasurable, the product has to fulfill a useful function, work well, and be usable and understandable" (Norman, 2002, p.42).

On the reflective level, it’s all about what we think about the product. Products provide messages, as they might remind us on special experiences, events, or occasions. They can evoke memories which might trigger powerful, long-lasting emotions, and as this, might become meaningful objects to us (Norman, 2004; Hassenzahl, 2003). Moreover, a product sends messages to others as it communicates something about oneself. The way people talk about products might indicate how they reflect on them (see further Section 2.3.2.1 about reflection through design). Do they complain about a product all the time, do they hide it or are they proud of it and show it to friends or other people? Every person is concerned with the way s/he presents her/himself to others, to establish the own self-image, and to find an own place in the world (Norman, 2004). Since each person has it’s own cognitions of, and experiences with a product, "it is all in the mind of the beholder" (Norman, 2004, p.87) if an object is for instance valued for it’s beauty (as below the attractive surface), personal touch or pleasure through the interaction.

To sum up, people perceive and process products, their features and prop-
erties on different levels. On a visceral level we can enjoy a product because of its aesthetic appeal. The behavioral level requires an understanding how people use products and what needs have to be fulfilled through them; discovering humans real needs is therefore one important challenge for product design. Moreover, Norman emphasizes the important aspect of tangibility and physical touch that provides a certain pleasure that is increasingly neglected by newer technologies. The reflective level takes into account that we not only communicate a certain identity to others through a product, but also that products might become meaningful objects in our lives, as they evoke memories and enable pleasant experiences. If we aim to create lovers’ objects that look good (visceral level), that enable the fulfillment of people’s true needs, have an appropriate usability, whose technology is incorporated into tangible real-world objects (behavioral level), and beyond allow our participants to become meaningful in their lives (reflective level), they might provide manifold pleasurable emotions and experiences with and through technology (see further also Section 2.3.2.1, Excursus: Reflective Design as Source for Rich Experiences).

### 2.1.1.2 Jordan’s Four Pleasures

Likewise, Jordan (1998; 2000) regards the relationship between user and product in a more holistic way. According to him, pleasure with a product develops through the person-product interaction. He defines pleasure as the “emotional, hedonic and practical benefits associated with products” (Jordan, 2000, p.12). Thus, pleasure with products requires a fundamental functionality and usability. The emotional benefits with a product are those that affect a person’s mood, as the interaction might be interesting, exciting, fun or satisfying, whereas hedonic pleasures are those that are related to the sensory and aesthetic pleasures (e.g. the objects’ beauty, touch and feel). All of these benefits have to be considered if it is aimed to design for pleasure. Moreover, Jordan sees an appropriate functionality and usability of a product as prerequisite for pleasurable experiences. This stays in contrast to Norman (2002; 2004), and Hassenzahl (2001; 2003) who admit that products might be stimulating or viscerally attractive without being necessarily usable. Overbeeke et al. (2003) on the other hand agree with Jordan, in assuming that enjoyable initial attractiveness judgments soon shift to frustration, if a product’s anticipated functionality and usability is missing.

Jordan distinguishes four types of pleasures: (1) physio-pleasure, (2) socio-pleasure, (3) psycho-pleasure and (4) ideo-pleasure. **Physio-pleasures** are those that derive from the sensory organs: sensual feelings and pleasures that are connected with touch (e.g. tactility of an object), taste or smell. **Socio-pleasures** are those that derive from our relationships to others (e.g. friends, partner, but also football club, religion). Through products, social
interaction with others can be facilitated (e.g. social online-networks like Facebook). *Psycho-pleasures* are related to the cognitive demands of using a product (e.g. complicated software for easy tasks would be less pleasurable) and the emotional reactions in experiencing the same (e.g. dissatisfaction). *Ideo-pleasures* are related to people’s values that can be communicated through an object: bio-products for instance embody the values of environmental responsibility (Jordan, 2000).

This pleasure-based approach encompasses a wider relationship between product and person, and as such enables a far richer understanding of people in experiencing products or systems, than do solely usability-based approaches. Similarly to Norman (2002; 2004), aside of a certain functionality and usability, the aesthetics and tactility of a product (physio-pleasure) as well as its potential to communicate a certain identity towards others (ideo-pleasure) should be respected for multifaceted pleasurable experiences. Beyond, Jordan suggest to consider social relationships to important others (socio-pleasure). Thus, the framework of the four pleasure types should be considered for decisions with regard to the development of Lovers’ objects and the interaction design as well.

These new and more holistic perspectives on HCI are focused on *positive emotional outcomes* of interaction processes (Hassenzahl & Tractinsky, 2006) and thus opposed to previous ambitions in this field that almost exclusively aimed to avoid system errors and to minimize frustration on the side of the user. Thus, by focusing on the formation of overtly positive emotions, the concept of UX promises much more than just the absence of usability problems (Jordan, 1998). Seligman and Csikszentmihalyi (2000) plead for a *positive psychology* that deals in fact with individual strengths and positive traits, and that is mainly concerned with the promotion of well-being: keeping a focus on making life worth living rather than on pathologies or human weaknesses.

The new trend in HCI allows a range of novel possibilities concerning human-computer interaction technologies (Hudlicka, 2003). Having currently a look at the different fields of interaction design, this development becomes soon apparent: One talks about pleasurable interactive products, affective designs, connected presence, persuasive technologies, content-aware computing or technology as personal jewelry that all provide "people with diverse new cognitive, emotional, social, aesthetic, and physical experiences" (Kaptelinin & Nardi, 2006, p.253). Therefore, why not identifying new castings of technology that target the support of human needs? In the current work, it is aimed to address the fundamental human needs for intimacy and belongingness, as these do not only support subject’s well-being, but beyond can be seen as strong source of motivation to engage with technology (Brewer et al., 2006). Gaver and Martin (2000) made already an attempt in this manner by attaching importance to a whole range of non-instrumental human needs.
like intimacy, surprise or diversion that can be addressed by technology. The growing interest in the development of digital artifacts and systems that support *intimacy* through technology becomes also apparent in the increasing amount of research projects in this regard. Some of these are presented in the following.

### 2.1.1.3 Intimacy via Technology - Related Work

The *SyncDecor* project of Tsujita, Tsukada und Siio (2007) made it possible for couples, separated by distance, to feel a sense of connection by interlinking household objects as bedside lamps (*SyncLamps*) or rubbish bins (*SyncTrash*) (see Fig. 1).

![SyncDecor devices: a) SyncLamps and b) SyncTrash (Tsujita et al., 2007, p. 2701).](image)

To make one’s own presence aware to the beloved, each partner was able to change the brightness of their own bedside lamp which in turn changed the brightness of the partners’ light accordingly. A variation of the rubbish bin state (i.e., open and close of the lid) leads to the same lid movements of the corresponding trash box. Couples included in a field test reported that they were able to feel the others daily activities and a certain *warmth* through the devices. Moreover, they used SyncTrash for casual communication by opening the lid repeatedly to attract their partner’s attention.

To communicate in an emotionally rich way, Chen, Forlizzi and Jennings (2006) developed *ComSlipper*, a sensible slipper to *express* and *feel* emotions in intimate relationships of partners separated by distance. Each slipper provided several touch sensors and one special sensor for heat; one slipper served as an input device and the other one as an output device. The patterns that result from the movement of the feet represent one of three potential emotions (sadness, happiness or anxiety) expressed by several light signals at the top of the output shoe. Whenever one of the partners wears his slipper, the slipper of the beloved warms up. To demonstrate that one is thinking of the partner it is only necessary to touch the sensor at the back side of the input shoe resulting in vibrations of the partners’ output-slipper.

A very similar kind of emotional communication can also be found by Good-
man & Misilim (2003) who developed the Sensing Beds that mediate the position in bed of the distributed partner by warming up small heating pads in ones’ own bed accordingly. Here again, telepresence is generated, bridging the distance between lovers that normally share a bed through an intimate communication of warmth. The beds can also be seen as an example of slow technology as they are not designed for efficiency. The slow warming of the bed, and the slow cooling when the same is empty, demonstrate emotional resonance in form of a translucent connection to the beloved person (Dunne & Raby, 1994 as cited in Goodman & Misilim, 2003). The slow technology approach is further described by Hällnas and Redström (2001); cf. Section 2.3.2.1.

Further, Tollmar and Persson (2002) developed the 6th sense which is a light sculpture to support emotional communication and intimacy in meaningful interpersonal relationships, but not necessarily within couples (see Figure 2).

![Figure 2: The 6th sense (Tollmar & Persson, 2002, p.45)](image)

For that purpose they installed connected light sculptures in the households of distributed family members. Each sculpture is developed to assess the amount of continuous body movement close to it over a certain period of time. In interpreting this movement as presence of a person the linked light sculpture in the remote household lights up. On the contrary, in absence of movement, the light of the connected lamps dims down. The warm light given by the sculptures was not only perceived as the awareness of important relatives but as a feeling of security (i.e., that the loved person is at home). The desire for technology that provides awareness about a loved partner stimulated also the work of Strong and Gaver (1996) in building simple network devices to support implicit, personal and expressive communication for couples where one partner is traveling while the other one stays at home. Whenever the absent partner holds a picture frame, an electric fan included in a piece of furniture at the deserted person’s home is triggered and starts wafting a feather in the air (Vetere et al., 2005). After Strong and Graver
(1996), "seeing the feather drifting in the air intimates the other’s attention with a lightness and dynamic that reflects the transience of thought" (p.1). The Kiss Communicator, designed by Heather Martin and Duncan Kerr, presents another way to demonstrate that one is thinking at the partner. It is a prototype developed to transmit a physical gesture in a sensual way between separated lovers. By gently squeezing the own Kiss Communicator, the other ones’ Kiss Communicator starts glowing slightly, inviting the remote partner to blow into her/his one (see Figure 3). The blowing creates some kind of animated light sequence that than can be send as response message back to the partner (Buchanau & Suri, 2000).

Figure 3: Marin and Kerr’s Kiss Communicator (Buchanau & Suri, 2000, p.432)

Likewise, to communicate, that one is thinking of the other, Kaye (2004) used, like Tollmar and Persson (2002), light to mediate intimacy between separated partners (see also Vetere et al., 2005). Both devices he developed - the Physical Intimate Object (PIO), a metal box including a button and a red LED, and the Virtual Intimate Object (VIO), which is a small circle in the taskbar of the PC screen that can change his color to bright red - have the same function that whenever one partner wants to indicate that he or she thinks of the beloved can do this in pressing the PIO-button or clicking on the VIO-icon resulting in a bright glow of the partner’s device light that fades out over time (Kaye, 2004). Even though this form of communication is extremely simple, it seems to be sufficient to stimulate communication between partners by giving each other a sense of connection and mutual awareness; and as such, might help to reduce loneliness (Kaye, 2006). Another more haptic-based approach is the inTouch project of Brave and Dahley (1997). Through touches people can feel a sense of connectedness to a beloved person. Touch is therefore not only a communicator of affection but also a physical way to express emotions. On this account, they
decided to enrich interpersonal communication by the possibility to express touch physically in realizing tangible devices. Each technical object they developed consists of three cylindrical rollers that are mounted on a base. Whenever a partner rotates one of the rollers the roles of the corresponding object behave in the same way. Through this device it is meant to feel the partner’s manipulation of the device as kind of physical touch.

Further work in this field was done by Mueller et al. (2005), who developed an air-inflatable vest that can be remotely triggered, and enables that distributed lovers can express a hug over distance. As such, the device tries to acknowledge the human need for physical closeness in remote communications, and might, as most of other presented works (PIO, VIO, SynchDecor, Sensing Beds, Feather and Sent, inTouch, Kiss Communicator) support the human need for social interaction with the beloved person.

These projects demonstrate how digital objects and systems can be used to support simple intimate acts. Heat, air, light, movement sequences as well as slight pressure were used to mediate and communicate intimacy, and to make the presence of important others available, in particular over distance. Moreover, the huge amount of work in this regard shows that there is obviously an interest in the application of technology to support needs related to intimacy, emotional closeness or physical contact with a beloved person. However, in the scope of the present work, it is aimed to support even more fundamental human needs for intimacy and belongingness through technology. This might not only promote subjects’ well-being and enable rich emotional experiences, but beyond, might facilitate that digital artifacts become personally meaningful in people’s lives.

2.1.2 Fundamental Human Needs

A better understanding of what is fundamentally important for the individual is necessary to create digital devices that are in fact able to address human needs in a significant way; an aspect that is mainly neglected by digital devices so far. The present work therefore attempts to extended perspective on human needs in HCI by introducing the human needs for belongingness and intimacy.

2.1.2.1 Need to Belong

In asking people about their most important and desirable aims in life, a successful, and secure partnership is still in first place (Grau & Bierhoff, 2003; Lösel & Bender, 2003). Following Reis and Shaver (1988), close relationships can be regarded as "some of life’s greatest rewards" (p.388). They not only achieve the function to fulfill needs that are crucial for survival (e.g., reproduction, food sharing, security within a group), but rather help to over-
bear feelings of coldness and loneliness in providing emotional warmth and welfare. In the scope of social psychology research, the need for closeness is often described by *affiliation* that can be seen as basis for social interaction; this is the motive to accompany with others and be liked and accepted by them. However, this motive is rather characterised by a fear of rejection than by the hope to belong to someone (Grau, 2003).

Baumeister and Leary (1995) emphasize the importance of the human desire for interpersonal attachment by defining it as *need to belong*. In their hypothesis of belongingness they propose that "human beings have a pervasive drive to form and maintain at least a minimum quantity of lasting, positive, and significant interpersonal relationships" (p.497). Their detailed review of empirical literature on this topic support and evaluate the assumption of a need to belong as a fundamental human motivation. To fully satisfy this need, two aspects have to be considered: (1) individuals need to have frequent personal contact with some other people in a pleasant way, and (2) these interactions have to be perceived as providing an interpersonal bond marked by stability, continuation and affective concerns (e.g., that one feels loved by the other, that the other cares about one’s welfare). Ideally, these affective concerns should be mutual appearing in reciprocal feelings about one another (see further section 2.2.2.3). Thus, mere affiliation alone, without a sense of caring can’t satisfy the need to belong, since mere interaction with strangers or non-supportive individuals would be just as little satisfying as a relationship that is characterized by intimacy, strong feelings of attachment and commitment in absent of frequent contact (Baumeister & Leary, 1995). The importance and strength of this need becomes obvious in individuals unwillingness to leave relationships, even though they are abusive. The dissolution of especially intimate partnerships comes along with distress and pain that individuals try to avoid. Aside, an absence of belongingness seems to be attended for instance by negative affects, psychological pathologies, stress, chronic depression, loneliness, social anxiety and further health problems (e.g., increased incidence of cancer, tuberculosis, heart attacks, suicide). (Baumeister & Leary, 1995, p.506). Several research findings show that individuals who are connected to others are healthier; presumably because of the achieved assistance and social support by others that helps overcoming stress (Baumeister & Leary, 1995; Oberg, 2003; Grau, 2003; Guerrero & Andersen, 2000; Smith & Mackie, 2007; Waring, 1984; Moss & Schwebel, 1993; Prager, 2000; Walester et al., 1978).

To conclude, individuals have a fundamental and pervasive need for regular social interactions with those people they feel connected to. Moreover, it’s not only the interpersonal attachment that seems to count, but the *positivity* of interaction in a stable and enduring context of caring and concern (Baumeister & Leary, 1995). Close relationships like those based on romantic love are to a great extend qualified to fulfill this essential human need (Grau, 2003).
2.1.2.2 Need for Intimacy

One of the most important components and central rewards of close interpersonal relationships - especially romantic ones - is intimacy. It allows individuals to feel emotional warmth, connectedness and caring for and with significant others (Smith & Mackie, 2007; Grau, 2003; Rattner & Danzer, 2001). Following Schäfer and Olson (1981), intimacy should even be integrated "as a vital ingredient" in the hierarchy of needs (p. 47, see also Maslow's Hierarchy of Needs, 1954). “The linkage between psychological intimacy and positive emotions is so profound that developmental psychologist John Bowlby (1969) has suggested it has an evolutionary basis” (Smith & Mackie, 2007, p.411). Thus, intimacy is a powerful determinant of individual health and well-being and as such is a valuable aspect of personal relationships.

However, a clear definition of the concept is rather difficult. Moss and Schwebel (1993) made the attempt and reviewed 61 definitions of the term. Their final analysis revealed seven intimacy aspects. The first characterizes intimacy as an exchange or mutual interaction, and thus as a process between people. According to that, intimate relationships develop slowly over time, as they build on the repetition and exchange of intimate interactions (e.g. expressions of wants, self-disclosure, pleasant acts) (Prager, 2000; Smith & Mackie, 2007; Schäfer & Olson, 1981; see further Section 2.2.2 on social interaction in romantic relationships). Further, intimacy encompasses an in-depth affective awareness or expressiveness that occurs as partners receive and express affect and emotions from and to another; for instance feelings of caring and compassion (Moss & Schwebel, 1993). In validating the partners' worth, feelings or actions and in expressing caring, providing assistance, listening to the others inner thoughts and giving positive feedback, one supports the partner socially and emotionally (Cunningham & Barbee, 2000). Likewise, in-depth cognitive awareness or expressiveness lead to intimacy as they go back to the reception and expression of cognitive material between partners (e.g. information about believes, values, attitudes and goals) (Moss & Schwebel, 1993). In addition, intimacy is related to physical closeness covering physical acts which could reach from proximity to sexuality. Intimacy also goes along with relationship commitment and a feeling of cohesion. These can foster trust and security in the partnership (Doherty & Colangelo, 1984; Larson et al., 1998). Some researchers even equal intimacy with influence (Kelley et al., 1983; Grau, 2003), as the degree to which events in on person's live affect the life of the partner (Levinger, 1980; see further interdependence and commitment concepts in Section 2.2.2). Communication and self-disclosure are relevant for the development of intimacy as well (Wariner, 1984), but rather as facilitators of it (Larson et al., 1998) than being a component of the intimacy concept itself (Moss & Schwebel, 1993). Self-disclosure, if it reveals personal or
private information, communicates also something about oneself (e.g. personal thoughts, experiences, meanings attached to events, facts about one’s own life, feelings). In unfolding our inner life, self-disclosure supports the development of closeness with others. An increased mutual knowledge and understanding of people (e.g. revelation of personal perspectives, reasons behind behaviors/decision/preferences) allows individuals to meet the partners’ needs more easily (Oberg, 2003; Prager, 2000; Grau, 2003; Felser, 2003; Dindia, 1997). Thus, since “self-disclosure satisfies a natural drive, develops intimacy, and builds health, you want to open yourself to others” (Oberg, 2003, p.23). According to Smith and Mackie (2007), self-disclosure increases interpersonal liking and trust as well, and therefore offers opportunities for sympathetic and supportive responses. However, the revealment of private information to others should be positive and reciprocal to increase or facilitate relationship development. The amount of self-disclosing behavior should be appropriate as well, since too much openness might be detrimental in partnerships in making the other person feel uncomfortable, or by disclosing hurtful or conflicting topics (Schäfer & Olson, 1981; Guerrero & Andersen, 2000; Smith & Mackie, 2007; see further Section 2.2.2.4 about communication in romantic relationships). Moreover, people in intimate relationships are connected through a general sense of closeness to another (Moss & Schwebel, 1993; Reis & Shaver, 1988).

To sum up, all of these seven aspects are closely related to intimacy between people. Thus, if it is aimed to support intimacy through digital design, artifacts should be developed that allow positive social and emotional exchanges between individuals. Moreover, they should give individuals the opportunity to communicate affection and reveal information about themselves (ideally through self-disclosure) to get to know each other better. This could not only increase a feeling of closeness, but beyond might support relationship cohesion and individuals satisfaction with the partnership as well.

2.2 Exploring Romantic Relationships

Much research in the field of UX focuses on sensing and responding to the emotional states of a single individual (Kaye, 2004). The present work, looks at couples using technology within their romantic relationship. Romantic relationships are a special form of intimate relationships - not only characterized through commitment, social exchanges, investments, interpersonal dependences and conflicts, but beyond, through affectional emotions, a sense of commonness, intimacy and love (Bierhoff, 2003).

The Lovers’ project aims to invite romantic couples in social exchanges through a process of creating, giving of, and receiving of positive and personally meaningful messages with their partners via the Lovers’ artifacts. Through the exchange it is hoped to support the above presented fundamental human needs for belongingness and intimacy and to stimulate cou-
ple reflections on their significant interpersonal relationship. Furthermore, a support of these essential needs through the exchange might enable couples to have rich emotional experiences through technology, especially since individuals experience many positive and negative emotions within close relationships. According to Bowlby (1979) emotions are felt most intensely when people are developing, renewing, maintaining, disrupting or terminating close bonds with others. Although emotions are not always evoked by a social context, people tend to experience emotions especially as a result of interacting with others (Guerrero & Andersen, 2000). Besides, emotions like love, passion and interpersonal warmth support individuals to form attachments or to maintain close relationships. Thus, the present Section starts with a theory of love (Sternberg, 1997), which encompasses the three components: intimacy, passion and decision/commitment, and leans against the concept definition of intimacy given in Section 2.1.2.2. Further, theories and concepts concerning social interaction within romantic relationships will be described in detail. In particular social exchange theories: interdependence theory, investment theory and equity theory will be presented as well as communication within couples. This Section ends by considering relational changes of romantic relationships over time.

2.2.1 Sternberg's Theory of Triangular Love

According to Sternberg's (1986; 1997) triangular theory, love is composed of three components: intimacy, passion and decision/commitment. The intimacy component incorporates feelings of closeness, connectedness and bondedness that can be experienced in romantic relationships. Passion is the component that leads to romance, physical attraction and sexual consummation whereas the decision/commitment component encompasses the decision that one loves another (short term-perspective) or the commitment to maintain the relationship (long term-perspective) (Hendrick & Hendrick, 2000). Sternberg combined the three components in a metaphoric triangle where the intimacy component forms the top vertex of a triangle, the passion component the left-hand vertex and the decision/commitment component the right-hand vertex (see Fig. 4a). The greater the amount of experienced love, the larger the triangle (see Fig. 4b). In case that all three components are approximately equally developed a equilateral triangle as can be seen in Figure 4a results, representing a balanced love. If one of the components is underrepresented, the shape of the triangle changes accordingly (see Fig. 4c). Hence, love cannot be defined by a single triangle but a great number of different shaped ones.
2.2.1.1 Three Components of Love

In the following, each of the three components as well as their characteristics will be presented.

Intimacy

The intimacy component derives largely, but not exclusively, from emotional investment in the relationship and can therefore be described as the warm component of love. It includes feelings that give rise to the experience of warmth in a loving romantic partnership, for example "feelings of (a) desire to promote the welfare of the loved one, (b) experienced happiness with the loved one, (c) high regard for the loved one, (d) mutual understanding with the loved one, (f) sharing of one’s self and one’s possessions with the loved one, (g) receipt of emotional support from the loved one, (h) giving of emotional support to the loved one, (i) intimate communication with the loved one, and (j) valuing the loved one in one’s life" (Sternberg & Grajek, 1984 as cited in Sternberg, 1986, p.121). In sampling a sufficient number of these feelings one experiences the intimacy component of love (Sternberg, 1997). Some actions through which one might express intimacy are for instance the communication of inner feelings, the expression of empathy for the partner, the offer of emotional or material support to the partner as well as the promotion of the partner’s well being (Sternberg, 1986). According to Guerrero and Andersen (2000) intimacy is a state of familiarity and openness.
Passion

The passion component involves largely motivational and further sources of arousal that lead to the experience of passion which is predominated by sexual needs and can be viewed as the hot component of love (Sternberg, 1997). Passion can be expressed by actions as hugging, gazing, kissing, touching and making love. Beside sexual consummation, physical attraction and romance, other needs, like those for affiliation, succorance, dominance, self-actualization, and self-esteem may influence the experience of passion. The strength of these needs varies across persons, kinds of loving relationships (e.g romantic relationships, which are characterized through high intimacy and passion, but less commitment) and situations (Sternberg, 1986).

Decision/ Commitment

Some relationships are neither characterized through passion nor through intimacy, and one might wonder what keeps them together. At this point, Sternberg takes the decision/commitment component into account, that could be essential for couples to get through hard times, and that controls the other aspects of the relationship as well (see further Section 2.2.2.2 about commitment in Rusbults’ investment model). The decision/commitment component comprises the cognitive elements that are involved in decision making and long-term commitment in relationships and can thus been seen as cold component of love. Both, decision and commitment, don’t necessarily go together. On the one hand, one can decide to love someone without being committed to the relationship in long-term. On the other hand, one can be committed to a relationship without admitting to love the other person (Sternberg, 1986; 1997). According to Sternberg, commitment in a relationship over time can be achieved in maintaining the importance of the same and in maximizing the happiness one experience through the it. This in turn demands that one expresses the intimacy and passion components of love as well as one’s commitment to the relationship through action. Some actions through which decision/commitment may be expressed are engagement, fidelity, pledging, staying in the relationship in hard times as well as marriage.

In the scope of the present work, it would be interesting to see how individuals perceive their relationship according to the three components and how the exchange and the content of video messages via Lovers’ object might influence them and their partnership.
2.2.1.2 Relationship Satisfaction as Result of Matched Triangles

Sternberg (1986) suggests that a match between the real triangle of love and an ideal triangle of this love is related to satisfaction in close relationships (Hendrick & Hendrick, 2000). In reference to the comparison level of Thibaut and Kelley’s interdependence theory (see further Section 2.2.2.1), the ideal concept of a relationship arises from past experiences with similar relationships as well as from one’s expectations with regard to it. By setting real and ideal concept (triangle) of a romantic partnership in relation, four possible triangles result (see Fig. 5).

![Figure 5: Levels of involvement between real and ideal relations: (a) ideal involvement, (b) underinvolvement, (c) overinvolvement, and (d) misinvolvement (Sternberg, 1986, p. 129).](image)

Whereas the first (Fig. 5a) presents the ideal constellation, that the current relationships fits perfectly to the ideal of it, the second (Fig. 5b) is characterised by an underinvolvement, which means that the respective person requires more involvement with regard to all components than is currently the case. The opposite is shown through the third triangle (overinvolvement, Fig. 5c), demonstrating that the person receives more intimacy and passion than is wanted and is more committed to the relationships than is favoured. The last triangle presents misinvolvement (Fig. 5d): Passion and intimacy are less developed whereas decision/commitment is higher as desired. This triangle explains that people are committed to a relationship, and stay together, even though they are not fully satisfied with it (see further Rusbult, 1980; 1983).

Since there are two persons involved in a relationship, one may not only
distinguish between a person’s self- and ideal triangle of love but also the triangles between the partners. Even though a partners’ real triangle of love matches her/his ideal one, it’s not meant that the relationship is experienced by the partner in the same way (discrepancy between perception of self- and other-triangle). Sternberg and Barnes (1985) conducted a study to examine the effect of different triangles on relationship satisfaction (as cited in Sternberg, 1986) by asking 24 couples to rate (1) how they feel about their partner, (2) what they think their partner feels about them, (3) what they wish to feel about an ideal partner, and (4) what they would wish an ideal partner to feel about them. In calculating scores for within-person differences as well as between-subject differences, it was possible for Sternberg and Barnes to compute values for all the differences between a person’s self-perception of the relationship, and the partner’s perception of the same as well as the ideal relationship both partners aspire. In addition, all participants had to fill out a questionnaire to assess relationship satisfaction. Expectedly, the ideal partners received better values than the actual ones. Nonetheless, the results show that the strongest predictor of relationship satisfaction is “the difference between how the other is perceived to feel about the self and how the ideal other would feel about the self” (Sternberg, 1986, p.131). With other words, the more one perceives the feelings of the partner towards the self in the same way one ideally wants the partner to feel, the more satisfied is one with the relationship. Interestingly, relationship satisfaction is not best predicted by one’s own feelings towards the partner, but by the way the other is perceived to feel about oneself. In order to minimize discrepancies in the perception of each other’s feelings it seems to be important that both partners express their feelings for each other through actions as those described above in relation to the three love components.

Against this background and in the scope of the present work, it would be interesting to discover, if the content of the messages the participants create and exchange enhance the disclosure of feelings as this might support intimacy (e.g. valuing the loved one in one’s life, supporting the partner’s well being, experiencing happiness with the beloved, etc.). Beyond, it seems to be relevant for the satisfaction of individuals within romantic relationships how they perceive the partner. The more the partner is perceived in a way one ideally expect her/him to behave (e.g. concerning the investment in and content of the Lovers’ messages) the more satisfied one might be with the exchange and the relationship in general. Also, it could be assumed that through the interaction with the Lovers’ artifacts and the investments in the message creations (i.e. time and effort in preparing the content) the commitment to it increases (see furthermore Section 2.2.3.2, Sternbergs’ love components over time). Moreover, it was pointed out that balances within relationships seem to be important for the success and sustenance of the same (see further Section 2.2.2.3, about Equity and Fairness).
2.2.2 Social Interaction in Romantic Relationships

Many social behavior can be seen in terms of exchanges. Social exchange theories are some of the most relevant concepts concerning social interaction within romantic relationships. Since the present project aims to stimulate the exchange of video messages through technology as interactive act between partners, social exchange theories are of particular importance. They regard a partnership similar to an economic behavioral model in which the interactions of each partner are continuously evaluated according to costs and rewards for oneself and the relationship (Thibaut & Kelly, 1959; Cate, Lloyd & Larson, 1982; Lösel & Bender, 2003). Rewards in this regard are those behaviors that lead to positive experiences, pleasures and further gratifications within the partnership, whereas costs encompass the mental and bodily effort combined with these behaviors as well as fears, difficulties and conflicts (Schneewind & Wunderer, 2003; Thibaut & Kelly, 1959). The relationship outcome results from the difference of rewards and costs. In simple terms: the higher the rewards in the relationship the more satisfied are individuals with it (Lösel & Bender, 2003). Moreover, relationship satisfaction is determined not only by the comparison of rewards and costs, but also by comparing the own partnership to own standards as well as other real or imagined partnerships. According to this, a relationship is more likely to be ended, if an alternative available relationship meets a person’s needs better (Schneewind & Wunderer, 2003); as for instance the need for belongingness and intimacy. From an economic perspective, commodities like affection, intimacy, love and social contact can only be found in stable intimate relationships. Becker (1976) even assumes that this is the underlying reason for people to build relationships with others (see also Balestrino & Ciardi, 2007; Lösel & Bender, 2003).

However, a perspective on social behaviour in interpersonal relationships in which people solely offer benefits to the partner in order to receive rewards in return (similar to the concept of distributed justice) and to selfishly maximize own outcomes, is not supported by all researchers in the field of social exchange and interdependence theories (Rohmann, 2003; Walester et al., 1978). In particular in communal relationships, like romantic partnerships or friendships, people should rather be concerned with each others welfare, and provide caring instead of expecting something in return (Clark & Mills, 1993; Hatfield et al., 1979; Michaels et al., 1984). Hinde (1979) argued that relationships between individuals are more than the sum of reciprocal giving and receiving, as the exchange behaviors occur over time and within a social context. Bierhoff (2003) for instance assumes that the exchange of benefits within close or intimate relationships is largely independent of the exchange of costs, as individuals are - through a more altruistic motivation - interested in the others’ persons wellbeing. Especially in romantic relationships, people might give for the sake of giving without continuously monitoring the reward
or fairness level combined with the effort they put into the relationship (Larson et al., 1998; Walester et al., 1978; Huston & Burgess, 1979). In such a case, the overall reward of the relationship seems to be more important than the outcome of the single individual. Nevertheless, many researchers showed that equity between partners according to their relationship reward-cost balance influences relationship satisfaction and commitment, and as how fair the partnership is perceived (Michaels et al., 1984; Hatfield et al., 1979; Walester et al., 1978; Lösel & Bender, 2003; Rohmann, 2003; Kalicki, 2003; see further Section 2.2.2.3 about reciprocity, equity and fairness). Hinde (1979) presents a further view on social exchange, the so called Marxist 'justice, which encompasses that each person deserves rewards according to her or his needs (e.g. parent-child relationships, in which mothers are giving to a great deal without the child being able to give back in the same way). In the following, the interdependence theory of Thibaut and Kelley (1959) will be presented as it makes up the base of social exchange theories and will provide an insight into the nature and meaning of interpersonal interdependence (e.g. being mutually responsible for one another). Grounded on this understanding, the investment model of Rusbult (1980;1983) is introduced which takes in particular the balance between benefits and costs and its influences on relationship satisfaction and commitment into account (cf. Rusbult et al., 1994). Beyond, the role of reciprocity, equity and fairness within social exchange approaches will be discussed. Since communication in form of interpersonal behavior between partners and through technology is important in the scope of the present work, it will be picked out as a central theme of social interaction as well. This Section closes with the presentation of an interactional framework which can be broadly adopted as background model for the Lovers' exchange.

### 2.2.2.1 Interdependence Theory

Following Thibaut and Kelley (1959), the main aspect of interpersonal relationships is interaction. Regarding a dyad, "by interaction it is meant that they emit behavior on each other's presence, they create products for each other, or they communicate with each other" (p.10). In analyzing social interaction within close relationships, a matrix can be used as technique to visualize all possible behaviors of two individuals (each person's repertoire of behaviors). Each cell of such a matrix shows all possible parts of interpersonal interaction and its consequences for each person (see exemplary Fig. 6). The consequences of interaction, so called outcomes, can be of different kind. Thibaut and Kelley just broadly differentiated rewards (e.g. enjoyed pleasure, satisfaction and further gratifications) from costs (e.g., requirement of high physical or mental effort, conflicts, feelings of anxiety or embarrassment). They assume that social interactions that are rewarding recur over
time whereas those that are less satisfactory disappear. In addition, the outcome for each individual of the relationship will be better, the more rewarding the behavior is that each person shows, and the lower the costs are. They further assume that individuals voluntary enter and stay in relationships only as long as the same is adequately satisfactory according to their reward-cost balance (Thibaut & Kelley, 1959; Rusbult & Arriaga, 1997).

Figure 6: Fictitious example for a matrix where the outcome (or 'goodness' of interaction) for each partner depends on their behavior. In this case the behavioral repertoire encompasses only the two possible acts: being cooperative or selfish. If both partners are cooperative the outcome for each is 8; if one of them is selfish, s/he gets the highest outcome while the partners’ outcome is the lowest; are both partner selfish is their outcome respectively 4 (own visualization according to Thibaut & Kelley, 1959, pp.14-15; Hinde, 1979, p.216; Rusbult & Arriaga, 1997, p.223).

The value of rewards and costs can be determined through exogenous and endogenous determinants: exogenous determinants are the personal characteristics as for instance values, needs, predispositions or skills that each individual carries as well as situational factors and physical objects, whereas endogenous determinants are those specific values that are intrinsic to the interaction itself and associated with the behavior of the other person (e.g. response behavior and sequential effects like satiation and fatigue that come in over time)(Thibaut & Kelley, 1959).

In their approach, Thibaut and Kelley focus merely on social interdependencies between people which arise through the partners’ ability to influence each others behavior through rewards or punishments. Thus, both partners should not only try to maximizes their own outcomes of the relationship, but beyond have to keep the partners’ profits in mind as well, if they want the relationship to continue over the long run (Hinde, 1979). Here again, it has
to be mentioned that Thibaut and Kelley pointed out that not all human behavior can be narrowed down to self-oriented acts where people solely aim to maximize own outcomes. Especially in close relationships behaviors is directed in a way that seeks to maximizes joint outcomes, as the example in Figure 6 demonstrates (Thibaut & Kelley, 1959; Hinde, 1979).

Beyond, each person has a network of diverse actual or possible relationships. Thus, outcomes of one relationship are compared for instance to the ones people experienced in the past (Hinde, 1979). Thibaut and Kelley further distinguish between the outcome level, that people think they optimally 'deserve' (comparison level, or \( CL \)) and the outcome level that an alternative relationship would provide for them (comparison level for alternatives, or \( CL_{alt} \)). The own relationship outcomes are evaluated relative to \( CL \) and \( CL_{alt} \). \( CL \) determines how satisfied individuals are with their relationship and how attractive the own relationships is, whereas \( CL_{alt} \) affects the dependence on it. The more dependent people are on their relationships, and the less attractive alternatives are (e.g. real persons, imagined relationships, no relationship at all), the more likely the remain in their actual one (Thibaut & Kelley, 1959; Rusbult & Arriaga, 1997; Lösel & Bender, 2003; Hinde, 1979). Thus, \( CL_{alt} \) can be informally defined as “the lowest level of outcomes a member will accept in the light of available alternative opportunities” (Thibaut & Kelley, 1959, p.21). According to that, as soon as the own outcomes of the relationship drop below \( CL_{alt} \) it is very likely for members to leave the relationship. The balance of own benefits and costs - as the result of subjective comparison processes - are not only put in relation to those of the partner, but beyond compared to own standards and available alternatives (Grau & Bierhoff, 2003; Schneewind & Wunderer, 2003).

To sum up, the general assumption of Thibaut and Kelley concerning interpersonal relationships is that it has to provide a reward-cost balance that is favorable, and which compares favorably to those of other relationships that might be available. Each behavior, is evaluated in terms of it’s rewards, costs and outcome for the individual and the relationship as a whole. Moreover, relationship satisfaction, attraction and dependence rely on the outcomes of the own relationship compared to others. The following Section presents the investment model of Rusbult (1980;1983) which strongly relies on this early social exchange approach of Thibaut and Kelley. Both theories will then be criticized and set more into relation to the present work.

2.2.2.2 Investment Model

The investment model of Rusbult (1980) expands the concept of the social exchange theories further. It considers not only the attractiveness of alternate relationships and one’s satisfaction with the own partnership for the prediction of the perpetuation of the same, but also the investments of
both partners. The model Rusbult proposed distinguishes between satisfaction and commitment in relationships. Whilst satisfaction encompasses the affect or the attraction to one’s own relationship, commitment incorporates rather the tendency to maintain the relationship and a feeling of psychological attachment to it (Rusbult, 1983; Bierhoff, 2003; Schneewind & Wunderer, 2003).

Based on Thibaut and Kelley’s interdependence theory, the investment model assumes in general that each partner is motivated to maximize rewards while minimizing costs. According to that, relationship satisfaction and attraction are a function of the discrepancy between outcome value ($O_x$) of the relationship and a partner’s expectations with regard to the general relationship quality that Thibaut and Kelley (1959) denoted as comparison level (CL). Outcome values of a relationship arise on the one hand from the individual’s subjective estimate of an attribute—that can be either positive (i.e., rewards) or negative (i.e., costs) and that can be material or psychological, may exist objectively or is the result of a subjects individual perception—and its subjective importance (Rusbult, 1980). Rewards of a relationship may for instance the experience of emotional involvement, to feel secure, worthy and validated through the partner, the opportunity to make intimate self-disclosures, to express sexuality or to find companionship for enjoyable activities (Smith & Mackie, 2007). The degree of relationship satisfaction is therefore represented by the outcome value (means the attractiveness of the current relationship that is due to the difference of rewards and costs) minus the subjects comparison level that constitutes the standard against which the partnership is evaluated:

$$Satisfaction_x = O_x - CL$$

According to formula 1, individuals should be more satisfied with their relationship by increasing rewards, decreasing costs (means a high Outcome value, $O_x$) and low expectations (as low CL value). As mentioned above, the investment model doesn’t only want to predict the degree of satisfaction but also the degree of commitment to a relationship. Commitment involves feelings of psychological attachment and is related to the probability that one of the partner leaves the relationship (cf. Sternberg, 1986; 1997). It is among other things part of the relationship outcome value and the outcome value of the best available alternate relationship ($O_y$) (Rusbult, 1980; 1983; cf. relation of CLalt and interdependence in Section 2.2.2.1). Following Baumeister and Leary (1995), "people are more likely to leave an intimate relationship if they have some prospect of forming another intimate relationship with someone else" (p. 516) and remain rather in their close relationship if no desirable potential partners are available. Similarly Levinger (1980) assumes that "decisions to end a marriage or other relationships depend strongly on one’s attraction to an alternative" (p.540). According to Rusbult (1980), the
evaluation of the best alternate relationship can be mathematical defined as:

\begin{equation}
(2) \text{Alternative}_y = O_y - CL
\end{equation}

However, commitment to a relationship is not only made up of the attractiveness of the best available alternative (shown in formula 2) subtracted from satisfaction with one’s own relationship (see formula 1) but also of the size of investments \( (I_x) \); as can be seen in formula 3 (Rusbult, 1980). The higher the investment size, the larger the commitment. Moreover, investments can be either extrinsic or intrinsic. Extrinsic investments determine individuals behavior from external interests (i.e., to keep a shared house or money) whereas intrinsic investments encompasses resources such as time, self-disclosure or emotional involvement (Lösel & Bender, 2003). Both types of investments make sure that a dissolution of the relationship is less likely since this would come along for instance with the lose of financial resources, invested time, feelings or a mutual circle of friends (Smith & Mackie, 2007). The investments into a relationship, as part of commitment, are therefore fundamental important for the maintenance of the same (Rusbult, 1980; Schneewind & Wunderer, 2003; Dindia, 2000). High investments in a relationship as well as the costs combined with the leaving of it serve as barriers resulting in a continuation of the relationship even though the satisfaction with it might be low (Smith & Mackie, 2007). Aside, a high commitment in satisfied relationships may lead to several adaption tendencies resulting for instance in a depreciation of alternative relationships, an emphasis on the positive characteristics of one’s own relationship as well as certain attribution processes so that the partner appears in a good light (cf. Schneewind & Wunderer, 2003). In sum, commitment is not only the result of extrinsic and intrinsic investments in the relationship over time encompassing the anticipated costs of a potential dissolution of the same, but also dependent on the outcomes of the current relationship and those of the best alternative (Rusbult, 1980). Therefore, commitment is composed of:

\begin{equation}
(3) \text{Commitment}_x = O_x + I_x - O_y
\end{equation}

Partners that are committed to each other feel more comfortable in relying on one another for advice, support and intimacy. Each believes in the other, her/his trustworthiness, responsiveness and availability when needed (Smith & Mackie, 2007). Even if it is intimacy that enables people to experience a feeling of closeness, it is commitment that holds the relationship together for the long term (cf. Sternberg’s matched triangles in Section 2.2.1.2). Following Rusbult’s assumptions, commitment should augment as a result of a valuable or rewarding relationship with low costs, low quality of alternatives and an increase of investments in the partnership. Since relationship satisfaction and commitment are distinct from one another, it’s for example
possible that one partner finds him-/herself to be unsatisfied with the relationship but still committed to it (Rusbult, 1980). Results of a cross-sectional survey and a longitudinal test of the investment model confirmed the general assumptions of Rusbult’s model on the process by which satisfaction and commitment change over time. Higher rewards resulted in increased satisfaction. Commitment was augmented by increased satisfaction, low quality of available alternatives and a larger investment size. However, changes in costs had no significant impact neither on the degree of satisfaction nor on commitment (Rusbult, 1980; 1983).

Regardless, social exchange theories like the interdependence theory or the investment model are often criticized for their assumption that individuals continuously evaluate their reward-cost balance when they interact with each other. One may rather assume that such evaluations are discontinuous, or occur only when something relevant concerning the relationship appears (Lösel & Bender, 2003). Levinger (1980) for instance sees a variation in people’s attention to the relationship outcome depending on the relationship stage (e.g. building a relationship, continuation of the same, etc.). According to him individuals are typically more careful in attending to future outcomes of the relationship and are more concerned with the positivity of their exchange balance at the beginning of a relationship. Moreover, neither Thibaut and Kelley nor Rusbult concretise which rewards or costs might be more important than others and in how far inter-individual differences matter in this regard (Lösel & Bender, 2003). More general critique with regard to social exchange theories encompasses the reduction of human interaction to a solely rational process based on economical theories, and the assumption that relationships develop in a linear fashion without respecting for instance backward trends in intimacy (Miller, 2004). Michaels et al. (1984) for instance note that equity principles can only be applied in early relationships stages. They assume that “as the bond strengthens, partners become less concerned with what they can provide for each other” (p.347). Section 2.2.3 on relationship development over time enlarges on this topic further.

In the present study it is hoped from the outset that the stimulated social exchange within partners of romantic relationships is positive, leading to an overall beneficial outcome for both members and thus to increased satisfaction with the partnership. Stafford and Canary (1991, as cited in Guerrero & Andersen, 2000) pointed out certain prosocial constructive behaviors that support relationship satisfaction. These are the creation of pleasant interactions as for instance giving complements, acting cheerful and optimistic and to accommodate to the wishes of the partner. Moreover, openness matters as it is related to self-disclosure, relational talks, the listening to the partner and the sharing of secrets. Beyond, assurance is pointed out which fosters commitment through social support or for instance the communication of statements such as “I’m here for you” or “I love you”. In the scope of the present work it is hoped that the exchange via Lovers’ objects indeed
supports prosocial behavior of that kind, as explained in detail through the fundamental human needs for intimacy and belongingness in Section 2.1.2. Moreover, as each partner is requested to invest in the message creation to please the beloved, commitment to the relationship might increase. However, the creation of messages and the hand over of the Lovers’ box to the partner is combined with effort, which will be regarded as costs in the scope of the present work. Moreover, attention will be paid to the equity and fairness balance between partners in investing in the Lovers’ project. This aspect will be further described in the following section.

2.2.2.3 Reciprocity, Equity and Fairness

A further reason—aside of interdependence, the achievement of rewards and altruism—for people to engage in social exchanges is the anticipation of a certain reciprocity. Reciprocity can be seen as an enforcer for social norms (here: in particular behavioral rules within interpersonal relationships) that demand a giving in response to receiving something from another person, and which are more or less accepted by both members. If both partners agree upon social norms within their relationship and adhere to them, conflict might be reduced and the reward-cost balance improved (Fehr & Gächter, 2000; Hinde, 1979).

However, reciprocity should not be equated with cooperative or retaliatory behavior that occurs repeatedly, as these arise because individuals expect for instance certain future rewards through their actions. Reciprocity rather means that one responds to a friendly action in a friendly way (positive reciprocity), and to hostile actions rather in a retaliatory way (negative reciprocity), and that this behavior is unrelated to expected gains. Moreover, a tendency towards positive reciprocity might come from a person’s tendency to reward the other with the hope to get rewards in return, as one expects the partner to be fair by giving something beneficial back (Hinde, 1979). This also distinguishes reciprocity from altruism, since unconditional kindness does not emerge as a response to received altruism (Fehr & Gächter, 2000).

The underlying reasons for reciprocal behavior can be of different kind. The response to hostile actions with hostility and to positive behavior with a positive response could be a mechanism to support friendly actions and to punish negative ones. Another reason could be that this response behaviors help maintaining equity between people (Fehr & Gächter, 2000). Hays (1985) pointed out that people favor those relationships in which both partners give and receive care. A relationship in which one partner would be over-benefited (even though this could be seen as the ideal according to the general aim of human beings to maximize own rewards in the first place) or under-benefited is less satisfying. Studies about unrequited love for instance
compared people who received love without giving it and people who gave 
love without receiving it. Surprisingly, both groups experienced this as a
ersive. Therefore, love seems to be highly satisfying only if it is experienced
mutually (Baumeister & Leary, 1995).
Thus, equity plays an important role within social exchanges. It is formu-
lated by Walester et al. (1978) through four propositions

1. Individuals try to maximize their relationship outcomes.

2. (a) Groups can maximize collective rewards by developing systems that
equitize the apportion of rewards and punishments among its members.
(b) Groups will reward members who treat other equitably and punish
those that treat others inequitable.

3. Members of inequitable relationships become distressed.

4. Members of inequitable relationships try to eliminate the distress by
restoring equity.

According to these propositions, and likewise to Thibaut and Kelley (1959),
individuals try to maximize their rewards while minimizing their costs to
have the best outcome of the relationship. Moreover, equity between peo-
ple matters, and should be induced to avoid distress and dissatisfaction. Of
course it has to be noted that equity refers to the individually perceived bal-
ce between the contributions of oneself and those of the partner (Larson
et al., 1998; Lösel & Bender, 2003).

An unbalance between partners can develop if one partner is over- or under-
bened in the relationship, leading to stress, less satisfaction with the
partnership and decreased happiness (Guerrero & Andersen, 2000). Under-
bened individuals get less out of their partnership than their partner (e.g.
their contributions/costs are higher or their benefits lower than the other
persons' ones). This leads to the experience of anger, hurt, sadness, frustra-
tion, resentment or depression. Even though over-bened individuals have
a greater outcome from the relationship than their partner, they rather have
negative feelings like guilt, anger or depression than being pleased about this
'over-bened' inequity (Rohmann, 2003; Larson et al., 1998; Cate et al.,
1982). The tensions that arise through this unbalance are uncomfortable
and tried to be solved for instance by changing the interpersonal interaction,
through cognitive reconstructions, or in some cases even through the resolu-
tion of the partnership (Hinde, 1979; Lösel & Bender, 2003).

The contributions and benefits that each individual gives and receives in a
partnerships should be similar for both, and thus fair (Larson et al., 1998;
Rohmann, 2003). This does not necessarily mean that benefits (e.g. amount
of love, care or financial security) and contributions (e.g. time effort, finan-
cial resources) are exactly equal, but that the ratio between them should
be perceived as balanced (Hatfield et al., 1979; Guerrero & Andersen, 2000;
Michaels et al., 1984; Cate et al., 1982). Certain benefits or contributions might compensate for each other. This makes it in particular different to measure equity or inequity especially within idiosyncratic romantic relationships in real-life situations (cf. Hinde, 1979). The exchanged commodities like love and intimacy are resources that are not only difficult to capture, but also hard to judge according to their value and worth for the individual; especially since individuals differ for instance in their views on what is rewarding and how highly certain things are positively or negatively experienced. The assessment of the extent of rewards, costs and equity is not only hindered by different properties and values of the exchanged commodities but also through the fact that people in intimate relationships do not solely interact in the short-term but are likely to interact over a long period of time, which might lead to the toleration of certain inequities over time (Smith & Mackie, 2007; Walester et al., 1987; Hinde, 1979).

Overall, one important factor for the success and sustainment of romantic relationships is the 'felt' balance between the contributions and rewards that both partners give and receive through their partnership, especially on an emotional level. An experienced balance and fairness supports individual's satisfaction with and maintenance to the relationship, since feelings like love and experienced intimacy are very important relational benefits within romantic partnerships. An absence of equity in this regard comes along more likely with negative emotions and distress. Thus, with regard to the present work, it is aimed to stimulate positive social emotional exchange behavior within romantic couples. It is further hoped that both partners contribute equitably in the creation of messages exchanged through the Lovers' objects. An exchange that is positively and fair experienced might support individual's satisfaction with their relationship and their well-being.

2.2.2.4 Communication in Relationships

Communication is something that inevitably happens between individuals (Oberg, 2003). Each communicative act (verbally or non-verbally) can be seen as a 'message', and the mutual chain of messages between two or more persons as social interaction (Watzlawik et al., 2003). This Section tries to contribute to an understanding of communication especially within romantic relationships. In this regard, Burleson et al. (2000) identified two broader perspectives on it. They distinguish between a strategical-functional view and a consequential-cultural view on communication. According to a strategic-functional approach, communication encompasses the creation of messages to serve individual goals. Thus, messages are purposefully constructed and needed to fulfill relationship tasks and functions of different kind (e.g. social, emotional or psychological support) to sustain the
relationship. To serve these functions, one can distinguish among communication motivation, skills and behaviors. Communication motivation refers to the intentions of the individual, whereas communication skills encompass the abilities of a person to accomplish her/his goals through communication. Here, the interpretation and expressiveness of messages are relevant. And the last, communication behavior, refers to the actual actions that are generated within a social context, and which are observable by the partner (Burleson et al., 2000).

However, communication encompasses not only the production and transfer of comprehensible and adequate information between partners (cf. for instance Shannon-Weaver model of communication\(^1\)) to accomplish relationship tasks and functions, but beyond provides something that Watzlawik et al. (2003) named as relational level of communication. According to Burleson et al. (2000) “research suggests that this relational level of communication is especially important in expressing feelings regarding control, trust, and intimacy” (p.248). Whereas the content aspect of a message reveals something about the self and how s/he feels about the partner or the relationship (as kind of self-disclosing behavior), the relationship aspect of communication defines the relationship between the partners (Watzlawik et al., 2003). By way of example, one partner discloses personal information, and thus defines the relationship as intimate. A supportive response of the partner to this intimate self-disclosing behavior would demonstrate an acceptance of this relationship definition, whereas a rejection would have opposite effects (Dindia, 1997).

Moreover, communication can either be positive or negative. According to Gottman et al. (1998), there are ‘four horsemen’ that can prejudice the relationship quality and the sustainability of the partnership. These are conflict in form of criticism, or continuous complaining; vilifications through insults and deprecative, cynical or sarcastic comments; defense as individuals justify themselves, provide contra criticism or reject guilt; and resistance as people refuse communication, don’t listen to the partner or simply ignore her/him (Lösel & Bender, 2003). Especially negative, conflicting but relevant communication leads individuals to search for explanations of the partners’ behavior (cf. attribution theories; i.e. Kelley, 1967). Nevertheless, explaining each other behaviors is in general a central motivation within close relationships, as each wants to find out more about the partner and what can be expected of her/him in the future (Kelley & Thibaut, 1987; Bradbury & Fincham, 1992; Grau, 2003; Kalicki, 2003). Communication

\(^1\)The Shannon-Weaver model (Shannon & Weaver, 1998) describes communication as a systematic information transfer process: A sender sends a message which is transmitted through a channel (e.g. speech, telephone, email) to the receiver. The transfer of the message is further influenced by noise (e.g. being tired, different understandings) and the context of communication. This model mainly focuses on ‘effective’ communication, but leaves social processes and issues unconsidered.
behaviors that foster relationships are for instance self-disclosure, active listening, positive experiences within the relationship during everyday life, positive expression of feelings, shared activities, a positive attitude towards life or humor. Even though the present Lovers' study aims to support especially positive communication (cf. previous Sections 2.1.2 and 2.2.2.2), potentially negative communicative behaviors should not be left unconsidered. How do participants cope with disappointments if they dislike a message from their partner? What kind of explanations and attributions will be drawn on? Further, it would be interesting to see how meta-communication (Watzlawik et al., 2003) - as communication about the exchanged messages of the Lovers' couples - influence their relationships. According to an empirical study based on questionnaires, Watzlawik et al. (1969; as cited in Banse, 2003) found that satisfied couples report more often meta-communicative behavior than did unsatisfied ones. Thus, in how far might meta-communication be relevant with regard to the partnership and partners mutual understanding, especially if the communication through the messages is problematic? If partners tell each other what appeared to be wrong it may have a beneficial effect on each others future behavior, and could help coping with disappointments and other potentially negative experiences (cf. Levinger, 1980).

The consequential-cultural approach on communication encompasses a less intentionally and rather dynamic view on communication. This view enacts the relationship between the people communicating who not only transfer content but also express the image of the self, the other and the relationship as a whole (Burleson et al., 2000). Moreover, communication helps creation of certain patterns, rituals and routines over time (see further also Section 2.3.2.1) and allows the development of shared personal codes and meaning systems between partners, which Wood (2000) for instance named as relational culture. According to him, relational cultures are "processes, structures, and practices that create, express, and sustain personal relationships and the identities of partners" (Wood, 2000, p.77). In other words, people create their own and unique meaning systems within relationships that both partners share and which can encompass for instance certain routines, rituals, norms, rules or personal codes of communication that develop in couples day-to-day life. The term relational culture also includes partners bringing knowledge to the relationship (e.g. gained from previous relationships, but also certain schemata and ideas about relationships and expected practices and functions), and which shapes each persons expectations towards the same. Through routine practices, like everyday conversations between partners, relational cultures are created. By imbuing ordinary daily life with shared relational significance, emerging relational cultures support interpersonal intimacy as well, as it helps developing shared interpretative frameworks for the own and the others behaviors and identities. Part of relational cultures are for instance jointly constructed symbolic codes that reflect the idiosyncratic shared meaning systems of the couple. This includes
for instance shared *stories* through which couples formulate and reformulate their relational life (Burleson et al., 2000). These stories reflect the values, norms, attitudes and standards of the teller and *mirrors the relational identity* of the couple (see further Section 2.3.2.2 about routines, self-extension and object integration in ones' life). Another typical characteristic of shared meanings systems are idioms (also *personal common codes*), which are codes jointly constructed by the couple within a unique relationship. This can for instance encompass *personal lexicons* (e.g. nicknames used, idiomatic expressions of affection, codes that refer to sexual activities) (Clark, 1996). Developed unique labels or relational symbols are for instance created for and through events, people or places that are of particular importance for the dyad (Hopper, Knapp & Scott, 1981).

Thus, communication in the scope of the present Lovers' project would encompass the way people think about the content of the video messages for their partner: What would the partner for instance like to communicate to the beloved other? What are the underlying intentions and are these positive or negative? It further matters, how these intentions are transferred into a video message (even though this process is accompanied by a digital media artist and her skills), and how they are individually perceived and interpreted. In addition, not only the actual video message within the Lovers' box has to be considered as a communicative act, but also the transfer and exchange between partners within a natural and social context. With regard to the relational culture of couples, it would be interesting to see which relational identities are communicated through the video exchange and how they are evaluated. What are for instance the values of their relational culture (e.g. what is important for them to say or not to say)? What are their beliefs according to the partnership (e.g. what assumptions do they have about their relationship and the partner), or what attitudes are put forth? Do they create a routine around the message exchanges, or develop and apply personal codes of communication?

### 2.2.2.5 Contextual Model of Marital Interaction

In this Section, the contextual model of marital interaction of Bradbury and Fincham (1989) is presented. Even though this model is first and foremost specified for interactions in marriage, it can be applied for any form of relationship that includes close interaction. In the scope of the present work, it can be considered as a framework for interpersonal interaction, since it takes not only discrete segments of behavioral exchanges and the current context of interaction into account, but also the conditions that influence the relationship over a long period of time (Bradbury & Fincham, 1989; Schneewind & Wunderer, 2003). A slightly adapted visualization of the model is shown in Figure 7.
Figure 7: Contextual model of partner interaction (cf. Bradbury & Fincham, 1989).
One core component included in the model is behavior. Bradbury and Fincham (1989; 1992) assume that behaviors are exhibited alternatively by male and female as they interact with one another. They infer that whenever for example the female attends to the behavior of the male, she interprets his behavior which in turn causes affective consequences (i.e. she’s glad or perhaps disappointed). The process of a subjective interpretation of perceived behavior is composited within the processing stage. The processing stage is assumed to occur rapidly and with less conscious awareness (Bradbury & Fincham, 1992). Beside attentional and perceptual processes, the processing stage is influenced by the distal and the proximal context. The proximal context encompasses momentary thoughts and feelings that are prompted on the one hand by events outside the relationship (e.g. work, weather) and on the other hand by those that are specific to the relationship. During the course of an interaction, the proximal context is updated frequently (Fincham et al., 1995; Schneewind & Wunderer, 2003). On the contrary, the distal context includes rather stable and continuing psychological difference variables of a person. These include, among others, personality traits, attitudes, beliefs, goals and chronic mood states of a person, experiences with previous relationships, and variables that develop over the course of the partnership (e.g. learning histories, relationship satisfaction). Whereas some personal variables support and stabilize the relationship (e.g. need for harmony; a focus on positive emotions as happiness, warmth, passion, excitement), others don’t (e.g. need for autonomy, novelty or change; a focus on negative emotions as anxiety, embarrassment) (Levinger, 1980; Grau & Bierhoff, 2003; Guerrero & Andersen, 2000). The model pays therefore attention to the individual differences of both partners. All the above presented elements of the distal context have a potential influence on the proximal context as well as on the processing stage, since the judgment of the others’ behavior is based on memories of prior behavior and expectations concerning appropriateness of the behavior within the relationship (Bradbury & Fincham, 1989; 1992). In addition, the proximal context moderates the elements of the distal context. It is also important to mention that the relationships among all these processes are likely to be probabilistic rather than deterministic.

Concerning the present study, participant are asked to exchange created video messages with each other. It would be interesting to find out more about the intentions and expectations that underlie this interactional behavior as well as about the subjective interpretations of the same (processing stage). This could support our understanding of relationship dynamics: How do couples develop a certain set of expectations over time based on past experiences (distal context)? In how far do inter-individual differences and the situational context (proximal context) play part in shaping our experience with a received message and moderate the processing stage, and the subsequent message?

By adopting this model for the present work, I suggest to divide behavior as
result of the processing stage into (1) an immediate behavioral reaction concerning the received message (e.g., being moved, disappointed through the content), and (2), an adjacent behavioral response to the partners’ message in form of the next message created. Moreover, I propose to see reflective processes as part of the processing stage, as individuals might recapitulate the received message, take additional and past events into account or communicate with the partner about thoughts and feelings relative to the message (cf. the role of meta-communication as presented in section 2.2.2.4), before they create their response-message.

Reflections evoked through the message exchange allows individuals the analysis of current assumptions about their relationship as they reconstruct existing knowledge and integrate new experiences with old ones. Reflections could also increase individuals’ awareness of incomplete or inconsistent mutual knowledge about the relationship by offering multiple perspectives (e.g., own perspective, partners’ perspective) on certain events or shared experiences; which makes the partnership also available for critical thoughts (Brookfield, 1988; as cited in Morris, 2009). This allows a better insight in the relationship, a reconsideration of particular aspects concerning the same (e.g., beliefs, attitudes, values), and as such, affects the distal context, and thus future decisions as well (Fleck, 2009).

To sum up, according to the framework, one partner perceives and interprets the others’ behavior (created message), and responds affectively to it. This process, influenced by the proximal and distal context guides the own behavioral response in form of a subsequent message. Therefore, Bradbury and Fincham’s model (1989; 1992) can be seen as a successful expanding of classical behavioral models by incorporating a variety of affective and cognitive aspects in the analysis of interaction processes (Schneewind & Wunderer, 2003), and emphasizing individual partner characteristics as well as external environmental factors as moderating forces. However, the model encompasses mainly short-term interactional processes and leaves further aspects with regard to long-term developmental processes within relationships unconsidered. The next Section expands on this.

2.2.3 Romantic Relationships over Time

At the beginning of an intimate romantic relationship, one may feel attracted to the partner and enjoys the romantic love provided to the full. These primarily feelings are difficult to maintain and change over time. Therefore it is important and necessary to take temporal changes in terms of relationships into account, too. Thus, a general concept of Levinger (1980), which broadly describes how long term relationships may change, is introduced in the following, leading over to a more specific concept of Sternberg (1986), who presents how his three components of love develop over time.
2.2.3.1 Levinger’s Five Phase Concept of Relationships

In examining how close relationships (especially marriages) continue and change over time, Levinger (1980) proposes a five phase concept which is illustrated in Figure 8.

Based on the evaluation of another person’s attraction in phase A one decides to expand the interpersonal connection by initiating a relationship with this person (phase B). With the growth of the partnership, the commitment to it as to the partner increases. Between phase B and phase C, the continuation of a the relationship, both partners invest in their relationship (e.g. spending time with each other) by offering one another incrementally greater rewards (see also investment model of Rusbult, Section 2.2.2.2). The three curves: CA, CB and CC, illustrate possible continuations of relationships, and reflect the idealized courses of mainly married couples. The first curve, CA, shows the ideal type of a relationship over time, where involvement grows until the end of the partnership (e.g. through a partner’s death). In this connection, involvement includes interdependence on, satisfaction with, and a sense of caring for the partner. The second curve, CB, demonstrates a static continuation of involvement, as the level of interdependence stays the same, whereas relationship excitement decreases. This can lead to a decline of involvement, and to an ultimate separation of the partnership at the end. The last curve, CC, includes temporal involvement fluctuations by taking relationship conflicts into account that may cause a deterioration (phase D) and at last the break-up of the partnership (phase E)(Levinger, 1980). However, the different curves refer only to the involvement of one partner. As Sternberg (1986), who distinguishes the triangle of the self from the other ones, Levinger also emphasizes that it is not meant that the partner experi-
ences the same degree of involvement at a particular time. Following Levinger’s five phase concept the transition between phase B (building a relationship) and phase C (relationship continuation) is characterized by commitment, since both partner intent to maintain the relationship by investing in it. Aside, he emphasizes that during the formative stage both partner are “more concerned with the rewards and costs obtained in their relationship; the positivity of one’s exchange balance is likely to be salient in one’s thoughts” (Levinger, 1980, p.536). This means, that in an early stage, each partner carefully attends her/his future outcomes of the relationship and pays attention to temporal changes in rewards and costs. Later, when both partner already accumulated a surplus of rewards, there is no need to account regularly on each other’s exchange balance and the accompanied level of fairness. For the purpose of the current study, and with regard to the above presented theories about social exchange, investment and equity, it is therefore recommended to include couples that find themselves between phase B and C.

2.2.3.2 Sternberg’s Love Components over Time

Sternberg’s view on temporal changes in relationships goes a bit further than the general concept of Levinger (1980). He assumes that each of the three above presented components of love has its own course in a romantic relationship that inevitably underlies certain temporal changes. Instead of regarding the components independent, or as isolated phenomena, he proposed to handle them in fact as interactive aspects of love whose importance may change over time (Sternberg, 1997; 1986).

Sternberg’s concept of the intimacy component which is largely composed of emotional elements, arose from Berscheid’s (1983) theory of emotional close relationships who assumed that emotion in close relationships can be experienced only as the result of interruptions; of so called paired action sequences or scripts. When two people get to know each other better, they form a large number of these paired action sequences; and it is because of these scripts, that they become increasingly better in predicting each others actions, cognitions, motivations and emotions. In early stages of relationships, there are not yet so many scripts established, so that it is characterized by a particular uncertainty appearing through disruptions in the interpersonal exchange. These disruptions, as sources of emotions, decrease over time as both partners become more familiar with each other. At the beginning of relationships, both partners pay more attention to the other ones’ behavior and are more anxious for explanations (Felser, 2003; Kalicki, 2003). Since the amount of emotions that can be experienced seems to be dependent on the amount of interruptions, a decrease of the latter may lead to less experienced
Figure 9: Ideal course of the level of experienced a) latent intimacy b) manifest intimacy c) passion and d) decision/commitment depending on the duration of the relationships (Sternberg, 1986, pp. 126-127).
manifest intimacy over time (see Figure 9a); a development that can be observed by all kind of successful relationships, and that Altman and Taylor (1973) named as social penetration. However, the decrease of interruptions as a result of uncertainty reduction causes a growing closeness within the relationship and thus, might lead to an increased amount of interpersonal bonding (latent intimacy, see Figure 9b) (Sternberg, 1986). A strengthened bond between partners means also that individuals become less concerned with what they can get from the partner and more concerned with what they can provide for the other (Michaels et al., 1984; Walester et al., 1978). Moreover, Altman, Vinesel and Brown (1981) argued that with the growth of the relationship individuals reveal less superficial information about themselves but rather disclose more about personal and intimate aspects of their lives. Hence, with the continuation of a relationship, two people get to know each other better, so that they might increasingly anticipate and predict the other ones’ behavior correctly. This, in turn, leads to less intense emotions in two ways: (1) in a advantageous way, since feelings of anxiety, fear or embarrassment decrease, and (2) in a less favorable way, as joy and passion might decline as well (Guerrero & Andersen, 2000).

Following these assumptions, the worst that could happen to intimacy in a relationship is stagnation. Perhaps, the exchange via the Lovers’ objects developed for the present study might also serve to overcome approximate stagnation by offering some variation in participants’ everyday life, and thus, might support relational growth regarding manifest and latent intimacy. Moreover, Guerrero and Andersen (2000) emphasis that people usually show their best behavior in initial stages of their relationships to foster positive impressions. This early phase is governed by rules of social politeness, as people display mainly positive emotions. If individuals express inappropriate negative emotions, they might soon be regarded as unlikable and deviant persons. As relationships grow, more idiosyncratic behavior emerges, and as people leave their best behaviors behind, negative affects and conflicts might increase as well. The exchange of positive messages, as it is aimed within the present study, might not only counteract to such negative developments, but rather might support the emotional connection within the dyad.

The concept of the passion component is based on Solomon’s (1980) opponent-process theory of acquired motivation. Following this theory of experienced motivation, passion as a motivational process can be either driven by a positive development where passion develops fast and fades out fast, or negative (opponent) as it slowly decreases and fades out over time. The combination of these two opponent processes included in a course of experienced passion over time can be seen in Figure 9c. Whilst the arousal is developing rapidly at the beginning, it soon reaches a peak where the opponent process starts, resulting in a decreased level of experienced passion through habituation, and a relative stable level of arousal until the end of the relationship. In case that one loses the partner (e.g. death, relationship break-up) the experienced
level of passion sinks below the baseline evoking feelings like depression, or high discomfort. Potentially, over time, the level of passion will return slowly to a state near the baseline (Sternberg, 1986).

As described by Rusbult (1980; 1983), the decision/commitment component is largely dependent on the duration of the relationship. If the relationship is successful and is becoming a long term one, the commitment to it increases over time in form of a s-curve. Otherwise, if the relationship flags, the commitment decreases. In case, that the relationship fails, the commitment to it may even go back to baseline (see Figure 9d). Following Levinger (1980), the level of commitment should rise as intimacy increases, and fall as intimacy decreases. This interrelation seems to be valid for at least Sternberg's curve of experienced latent intimacy and decision/commitment that are illustrated in Figure 9.

To sum up, the importance of each of the components depends on the duration of the relationship. While passion and manifest intimacy tend to play an important part at the beginning of a new partnership and cause intense emotions, latent intimacy as well as decision/commitment become more important over time as the relationship turns into a long-term one (Sternberg, 1986).

According to these suppositions, participants selected for the Lovers' study should be willing to maintain the relationship and aim to convert their relationship in a long term one, so that they do not only underlie passion but are also keen to invest in it. Aside, and with reference to the intimacy component, one may expect that at the beginning of a relationship, when both partner get to know each other better, there are still interruptions to overcome by developing paired action sequences. Interpersonal interactions help generating scripts that lead to emotions which are followed by manifest intimacy and an increasing latent intimacy over time. Hence, this first period of the relationship could be more dynamic and exciting with regard to emotional intimacy, since it offers both partners the opportunity to discover new information about one another through shared activities, and self-disclosure (e.g., about important experiences in one's lives, certain wishes for the future). Furthermore, it is the intimacy component that appears to make up the core of many close relationships, whereas passion seems to be limited to just certain kinds of loving partnerships; decision/commitment also varies highly across couples. Moreover, even thought it might be the passion component that leads someone to a relationship, it is the intimacy component which is important for the development and sustainment of closeness within it, whereas commitment is responsible for the continuity of the same.

However, it has to be clarified that both concepts presented here, that of Levinger and Sternberg, are idealized illustrations of how relationships may change over time, and show just a fraction of the numberless possibilities of temporal changes in long term (Levinger, 1980).
2.3 Designing for Personal Emotional Significance

In this Section, a design approach is proposed that might allow objects with incorporated technology to become personal and emotionally significant in people's lives. This requires not only a broader and more fundamental understanding of human needs, but also a deeper comprehension of individual experiences. Therefore, the user experience model of Hassenzahl (2003) will be presented first, as it builds the UX framework for the Lovers' study. The second part suggests the design of objects as a blank canvas meant to be completed by users, their individual meanings and roles, rather than predetermined and limiting their purpose. Through a certain ambiguity in design, people are forced to make sense of new digital artifacts in their lives, leading to a deeper engagement with the product. This Section also pays attention to some strategies and design principles that show how such a design might be achieved. Moreover, it will be highlighted that routines involving the product as well as meaningful relationships (e.g. romantic relationships) might increase the likelihood of an attachment.

2.3.1 Hassenzahl's Model of User Experience

In Section 2.1 it was argued that human factors should be taken into account in creating interactive products or systems that go beyond traditional usability to provide pleasurable experiences for users. However, the notion and the concept of UX is still vague (McCarthy, Wright, Wallace & Dearden, 2006) and there are just a few models (e.g., Jordan, 2000; Logan, 1984 as cited in Hassenzahl, 2003) that try to incorporate aspects such as human needs and pleasure. For a better understanding of how people might experience technology, Hassenzahl (2003) proposed a global model of UX that encompasses not only the subjective nature of experience, but also the user's perception of a product, her/his emotional response to it as well as the situational context. Therefore, it's his model which forms the user experience framework in the scope of the current work.

Figure 10 gives an overview of the key elements of Hassenzahl's model. By combining certain product features (for instance the functionality, content or presentational and interactional style of a system), the designer intends consciously or unconsciously a particular product character as well as certain resulting consequences of the user's perception of the same (e.g., that the product looks good and will be perceived as pleasurable). The product character itself encompasses pragmatic product qualities (PQ, e.g. utility and usability) and hedonic product qualities (HQ), that refer to task-unrelated be-goals such as stimulation or identification (cf. also Burmester et al., 2002; von Wilamowitz-Moellendorff et al., 2007). Pragmatic qualities are required to manipulate the environment to achieve behavioral goals effective and efficient, whereas hedonic attributes might stimulate and enable personal de-
velopment or growth, and support the expression of identity (Hassenzahl, 2003). As this, PQ address human needs for control, security and assurance (Burmester et al., 2002). In contrast, HQ are related to the users’ self (Karapanos et al., 2009) in addressing human needs for novelty, change and social power (e.g., by communicating a certain status); and refer to quality dimensions that are not obviously task-related such as originality, exclusiveness or innovativeness (Hassenzahl et al., 2000; 2001; Overbeeke et al., 2003; Burmester et al., 2002). Since individuals strive for personal development and reach best performances at a level of optimal excitement, products should not only be usable, but rather provide stimulation as well as new impressions, opportunities, insights and challenges (Hassenzahl et al., 2001; Hassenzahl & Tractinsky, 2006; Reeps, 2006).

![Figure 10: Hassenzahl’s model of user experience from (a) a designer and (b) a user perspective (2003, p.32).](image)

Even though the designer intends a certain product character, it’s not meant, that user perceive and appreciate the product in the same way. Rather, each user constructs her/his own personal version of the products’ character, the so called apparent product character which is an individual reconstruction of the designer’s intended one (Hassenzahl, 2003).

In consideration of the usage situation, the perception of the product char-
acter leads to emotional and behavioral consequences (e.g., satisfaction or frustration, decreased or increased time of usage) as well as an overall judgment of the products’ appeal (i.e., good/bad) resulting from the combination of PQ and HQ (Hassenzahl, 2004). Interpersonal differences in the perception and evaluation of a product character are influenced in each case by the personal standards and expectations of the individual (see also individual differences in Section 2.3.1.2). It must also be noted that the perception of the product character can change over time (e.g., as a result of growing knowledge about, and experiences with the product; see further Section 2.4)(Burmester et al., 2002; Hassenzahl, 2001).

The described process from the subjective product character perception and construction to the resulting experience always takes place, no matter what the designer originally intended or how many information are given about a certain product. Our experiences are not only influenced by the type of product we interact with, but also through the situational context (mode of use) and individual differences. These aspects and their relevance for the present study are elaborated in the following.

2.3.1.1 Type of Product

Hedonic and pragmatic product qualities, as described above, both contribute to the overall product character. However, research results of Hassenzahl (2001), show that PQ and HQ are perceived as independent; for example a product can be seen as both innovative without being usable, and vice versa (cf. also Hassenzahl, 2004; Burmester et al., 2002). Further studies of Hassenzahl et al. (2001), demonstrated that from the user’s perspective both qualities seem to compensate for each other.

Assuming that the user’s perception of PQ and HQ can either be strong or weak, four different types of product characters arise (see Fig. 11). Whereas a combination of strong PQ and HQ lead to an overall desired product, a weak characteristic of both dimensions results in a product that is neither satisfying nor usable, and therefore simply unwanted. Products are rarely balanced with regard to their qualities; most are either primarily pragmatic (so called ACT products) or primarily hedonic (so called SELF products) (Hassenzahl, 2003; Reeps, 2006). Whilst the usage of task-oriented products as tools might be satisfying (e.g., successful achievement of a behavioral goal), self-oriented products could lead to stronger emotional reactions (e.g., pleasure) and are characterized by a more persistent and more personal relationship with the user (Hassenzahl et al., 2003).

Taking all these aspects into account, our intention as designers with regard to the Lovers’ objects is, that they are not only usable, but should ideally be seen and perceived as a new opportunity to express oneself towards the partner. Moreover, they have been designed to be stimulating so that one
is willing to interact with them should allow the participants to reach new insights in their relationship and should become meaningful to them as they might become a part of the relationship. Since our focus lies on couples, their relationship as well as the relation between them as users of the objects, the wooden box as well as the key should primarily be perceived as SELF products (see further reflection through design in Section 2.3.2.1).

2.3.1.2 Mode of Use and Individual Differences

As mentioned earlier, Hassenzahl’s model of UX takes also the situational context into account, since pleasurable experiences and activities are dependent on the situation. Following Blythe and Hassenzahl (2003): "Each situation is a unique constellation of a person’s current goals, previous knowledge and experiences, the behavior domain, and applicable social norms" (p.94). Beside the situation and its circumstances, individual differences moderate how users perceive product qualities. Whereas some prefer interactive products that are quite simple and robust, other might favor those that are challenging and stimulating (Karapanos et al., 2008). Following Jordan (2000), not only people’s personalities influence the way people respond to and interact with products, but also their hopes, fears, aspirations and dreams. It is therefore problematic to predict for example emotional reactions in certain usage situations.

Hassenzahl’s solution to this problem is the propose of a definition of different usage modes that represent the user’s mental state in relation to a product or system (von Schaik & Ling, 2009). He distinguishes between action mode, where the usage of a product is an "end in itself" and goal mode.
where the product is "a means to an end" (Hassenzahl, 2003, pp.39-40); both are respectively triggered by the situation. The perception and evaluation of a product or system through the user is therefore dependent on the fit of the respective usage mode and the primarily product character (see Figure 11; Hassenzahl, 2003). Regarding the project presented in the scope of this thesis, the interaction with the Lovers' Boxes is meant to be a goal in itself. Since an experience "is a unique combination of various elements, such as the product and the internal state of the user (e.g. mood, expectations, active goal), which extends over time with a definitive beginning and end" (Hassenzahl & Tractinsky, 2006, p.94), we're only able to design for experiences with digital devices (cf. Blythe & Hassenzahl, 2003; Overbeeke et al., 2003) by regarding "the user as a protagonist and co-producer of narrative experience rather than a passive consumer of a product's meaning" (Dunne, 2005, p.69). Overbeeke et al. (2003) emphasis that the design of a product should offer the user the opportunity and freedom to build her/his own experiences. Therefore, even it is aimed to design for SELF-related products, whose use should be a goal in itself, it is left in the hands of the individual how they experience the interaction with them.

2.3.2 Attachment to Technological Artefacts

The previous Section drafted the user experience model of Hassenzahl (2003) which takes human needs for stimulation and identification into account. However, many technological devices are not designed to enable a deeper identification, and the stimulation they provide is most of the time just short-lived. This applies in particular to gadgets, which are small mechanical devices or appliances that are interesting for their ingenuity (e.g. mobile phones, digital key chain frames). Their originality and inventiveness confer to their character as novel, remarkable and attractive products. At the same time, the benefit that gadgets achieve through their novelty is fleeting and therefore just temporary. Gadgets are first and foremost targeted on the completion of a task in a novel or particular useful way, and meant to be used by a broad mass of consumers as well. Since novelty is in essence transient, a persons attachment to a gadget is grounded on the objects' functionality, leading to an easy replacement of the same through newer versions (Wallace, 2007; Pierce, 2009). Against this background, gadgets offer little opportunity to embed our experiences within them (Olivier & Wallace, 2008; Hallnäs & Redström, 2001), they "are not designed to be personally significant" for the individual, they are not meant to last, neither physically nor emotionally (Wallace, 2007, p.64, original emphasis). Therefore, one momentous risks concerning the design of the Lovers' objects is, that they will be perceived as having superficial novelty that is in nature ephemeral. Such gadget-like qualities are responded to with only fleeting interest, taking away the possibility that technological artifacts can become meaningful objects in
our lives. Thus, the Lovers’ objects as digital artifacts should not be perceived as
gadget-like sophistication that people respond to with only fleeting interest.
Rather, it is aimed to promote their sustainability and durability by stimulat-
ing reflection on their purpose and personal meaning through the individual. This
might be reached through the creation of aesthetic real-world objects
that don’t look like digital objects, but please through an aesthetic appearance,
and atypical way of interaction. Moreover, if the purpose of the Lovers’
objects is kept open to individual interpretations and roles, mean-making
processes on the users’ side are stimulated, which in turn might support a
deeper attachment to the same. A personal emotional significance of the
Lovers’ objects could be also intensified through the involvement of subjects
as co-creators of their own content and experiences, and an integration of
the artifacts in individuals’ everyday lives; Section 2.3.2.2 enlarges on these
aspects.

2.3.2.1 Reflection through Design

As has been outlined in Section 2.3.1, experience is complex, very dynamic
and a highly subjective phenomenon, which not only depends on the per-
ception of the design, and interindividual differences, but also on contextual
factors. It was also stated, that it is therefore not possible to create a certain
experience but to create some kind of frame for experiences with technology
(Buchanan & Suri, 2000; Hassenzahl & Tractinsky, 2006, Overbeeke et al.,
2003; Blythe & Hassenzahl, 2003; Dourish, 2001). Following Wright, Wallace
and McCarthy (2008), a good experience-centered design requires a rich
engagement between users and designers in order to understand how users
make sense of technology in their lives. Since experience seems to be as much
about what individuals bring to the interaction as about what the designer
leaves there, technological objects should enable users to be co-creators of
their own experiences. Höök et al. (2008) recommend that interactive sys-
tems or objects should encourage individuals to negotiate meanings on their
own, since meaning "is not something a designer can design for entirely;
but instead, is completed, lived, by the person experiencing" (p.649, original
emphasis). Accordingly, technological objects should enable users to create
their experiences with technology by leaving space open for individual inter-
pretations and meanings.

To open new design spaces, and to identify blind spots in the field of HCI,
Sengers et al. (2005) suggest to consider critical reflection as a core principle
digital design, as it is a crucial element of a socially responsible design
practice. Based on critical theory, individuals should understand the world
through their own reasoning processes. Through reflection, unconscious as-
psects of our experiences with technology or our relationships to others be-
come consciously aware; which supports our understanding of the same and makes conscious choices available as well. Thus, it is proposed to design interpretative flexible systems or objects whose meaning is determined by users and designers. Existing work in this field is primarily concerned with the stimulation of reflections through an open (Sengers & Gaver, 2006; Höök et al., 2008), ambiguous (Gaver et al., 2003), reflective (Sengers et al., 2005), slow (Hallnä""s & Redström, 2001) or expressive design (McCarthy et al., 2006). An integration and presentation of these approaches as well as proposed design principles and strategies follow.

**Open, Ambiguous or Slow Design & Mean Making**

Products or systems are traditionally developed by designers with a focus on one specific interpretation of what they are for and how they should be used. A disagreement concerning an assigned meaning between designer and user was seen as a problem that has to be solved through the identification of the correct interpretation. However, Sengers and Gaver (2006) and Gaver et al. (2003) argue that multiple interpretations of a product are not necessarily a problem, as they might highlight many useful and fruitful aspects of how a system can be understood and integrated in people’s lives. Products that are open for different interpretations through the individual, enable manifold perspectives, motivations and meanings, rather than forcing users to accept the designers’ interpretation of the same.

Gaver, Beaver and Benford (2003) see ambiguity as a rich resource for reflection through design. Ambiguity in this regard has to be understood as a property of the interpretative relationship between a person and the artifact of interaction. By admitting space for multiple co-existing interpretations of an ambiguous object (Sengers & Gaver, 2006), individuals might be empowered to make sense of the same, its meaning and purpose. Hence, a certain ambiguity of relation might evoke a deeply personal projection of peoples’ subjective experiences and attitudes onto a new design or situation. This might "allow products and systems to become psychological mirrors for people, allowing them to try new identities or to question their values and activities" (Gaver et al., 2003, p.239). Moreover, a close engagement with the object enables the creation of a more personal and deeper relationship to it (Gaver et al., 2003).

Hallnä""s and Redström (2001; 2002) investigate a philosophy of slow technology a further contribution to rethink digital objects and their purposes. Their approach sets digital artifacts through a slow appearance into focus, enabling reflections through an object’s expressiveness, its depth, which allows the object to have a meaningful presence in our lifeworld. According to them: “If we want to understand what it means for an artifact to be part of someone’s everyday life - and eventually to design for this - we have to
consider its presence beyond just being physically there” (Hallnäs & Redström, 2002, p.108). In this context, slow means that, given the design of a digital object, we have to learn how it works first, have to understand why it works the way it does, have to apply it, have to figure out what it is, or what consequences the usage of it has. As such, slowness is not a matter of time perception, but rather a process of internal learning and mean-making. Overall, ambiguity, openness or slowness don’t mean inconsistency, randomness or fuzziness, but rather encompasses a less clear, less precise or less obvious approach, a certain skepticism concerning an object and its role. However, caution must be taken respecting the degree of paradoxicality. Too unspecific objects could be hard to understand, which includes the risk to be rather perceived as a poor and frustration provoking implementation than be engaging and thought-provoking. Thus, designers are challenged to find an appropriate trade-off in design for reflection that is neither too open nor too closed for individual interpretations. Hence, some practitioners recommend to use familiar practices or elements in an unusual way, and to provide a certain usability despite the paradox (e.g. Höök et al., 2008; Sengers et al. 2005; Dalsgaard, 2008).

**Design Principles to Provoke Thoughts**

To design for reflection, it is recommended to develop digital objects as kind of blank canvas that can be interpreted by individuals in multiple ways, as their ultimate purpose and meaning is not purported (Sengers & Gaver, 2006). An offer of unacustomed roles to users, enables more idiosyncratic or unfamiliar interpretations of them (Gaver et al. 2003). Thus, reflective designs should be non-reductionist concerning an objects’ role, and enable a certain interpretative flexibility towards the same (Sengers et al., 2005; Boehner et al., 2005; Höök et al., 2008). Moreover, it is suggested not to predetermine how technological artefacts can relate to subjects’ lives, by leaving a space open for individual expressions, behaviours, contents and interpretations around a given topic (Sengers & Gaver, 2006; Höök et al., 2008). This allows individuals to be co-creator of their experiences, and prevents the objects being simply categorized.

If things are pointed out without any explanation, processes of sense-making are encouraged as well (Gaver et al., 2003). The highlighting of aspects of an object is one strategy to facilitate reflection, another one is amplification. Pierce (2009) proposes within his material awareness approach to amplify an objects’ history (by displaying for instance additional, thought-provoking and normally inaccessible information about the object-person relationship over time) or agency (e.g. by giving objects more human-like needs, behaviors and thoughts), which can also increase the attachment to them. Hallnäs and Redström (2001) suggest to amplify given environments by accentuate
for instance, the presence of objects, and giving individuals time to reflect on an artifact, as they are invited to find possible explanations for unusual installations or applications. To this end, objects should not immediately be impressive or exciting, but rather be composed of simple, clear and distinct materials that allow a certain slowness in appearance and presence. Beyond, the design of digital objects should purposefully block expectations we normally associate with technology, and thwart any consistent interpretation, to allow new and alternative ones (Sengers & Gaver, 2006). This can be reached by way of example through a de-familiarization or making strange of the familiar (Bell, Blythe & Sengers, 2005) or by inverting traditional assumptions or metaphors (Sengers et al., 2005). Reflection can further be evoked through the expressiveness of digital objects. On this, the aesthetic, beauty and physicality of technology should be more consciously considered (Hallnäs & Redström, 2001; 2002; McCarthy et al., 2006; Höök et al., 2008). According to Wallace and Press (2004), beauty in objects is not found by the designer, but develops through the making of the object, as an engagement between maker, material and process of making. To enrich the expressiveness of an object, and by adapting a more holistic approach on experience, the physicality of digital objects should be respected to allow more natural and emotional pleasures. Physical object encompass the richness of the material world (e.g. appearance, texture, sound, etc.) and address all human senses (Djajadiningrat, Overbeeke & Wensveen, 2002; Overbeeke et al., 2003; Norman, 2004; see also behavioral design in Section 2.1.1.1). Thus, since emotions and experiences are vital parts of individuals’ reflective processes, the materials used for the objects’ design should also be well considered.

Excursus: Reflective Design as Source for Rich Experiences

The realization of a contradictory interaction design might not be immediately understood by the individual. As it resists any easy conclusion we might reach about it, it could give us a feeling of disruption, but might be enlivening at the same time, as we are attentive and curious (Wallace & Press, 2004). Most ordinary and familiar electronic products are already defined in our minds, they don’t have the potential to make us wonder (Paulos & Beckmann, 2006), they do not offer the potential to enchant us (McCarthy & Wright, 2003; 2004; McCarthy et al., 2006; Wright et al., 2008). Hence, a process of sense-making can also provide rich experiences with technology as the resolution of the paradox might be pleasurable, liberating (Sengers & Gaver, 2006), evocative (Höök et al., 2008), mysterious, delightful or intriguing (Gaver et al., 2003).
2.3.2.2 Integration in Everyday Life, Routines & Self-Extension

Zimmerman (2009) sees a potential for attachment not only in mean-making processes, but also in those products that we repeatedly use in activities that give our lives significance, that we incorporate into relationships, and around which we develop certain routines and rituals. Equally, Overbeek et al. (2003) state that "intimacy with a product can be enhanced when the product stimulates the user to create his story and rituals during usage" (p.11). Hallnäs and Redström (2002) point out: "When we let things into our lifeworld and they receive a place in our life, they become meaningful to us" (p.113); since this is an act of accepting the object. To become meaningful can be an explicit act as for instance the giving/receiving of a gift or a certain ritual, but it can also happen gradually over time (Hallnäs & Redström, 2002). Hence, if it is sought to design digital artifacts of sustainability and durability in relation to the individual, a closer personal engagement with the same through reflective processes has to be encouraged, but beyond, the integration of them into subjects’ life. Thus, technological objects need to be designed as open systems and tempting means for interaction, exploration and interpretation in a real world environment (Hummels, 2000).

Belk (1988) on the other hand sees product attachment for instance as a result of self-extension, as people extend their sense of self, their identity, through a product to include important people, places or things. People learn, define, express and remind themselves and who they are through their possessions. Each product reveals something about the user and it’s relationship to the same (Djadjadiningrat et al., 2002). In this manner, products are used to seek happiness, as reminder of certain experiences or other people in one’s life. Following Belk (1988), self-extension through an object or product can be achieved in different ways, for instance through (1) control and mastery of an object, (2) the creation of an object by oneself (cf. Wallace & Press, 2004), (3) through knowledge of an object, and (4) through some kind of contamination as we habituate and proximate to an object.

Kleine, Kleine and Allen (1995) argue similarly that people get in particular attached to those products that play an important role in their life story, as they reinforce for instance affiliation to meaningful groups, and capture or communicate a certain identity.

Thus, to design for attachment of personal emotional significance to the Lovers’ objects, it is recommended to keep the design space open for individual meanings concerning the objects’ purpose. The interaction between participants and artifacts should be frequently and enduring to allow the development of a routine, and an integration of the objects in participants’ everyday lives. As participants determine and create their content, and become hopefully more familiar with the Lovers’ objects over time, the artifacts might become a valued extension of the relationship.
2.4 User Experience over Time and It’s Measurement

What most of the present projects and theories concerning HCI neglect is the aspect of temporality which encompasses how the quality of the users’ experience changes over time. In the scope of Hassenzahl’s model of UX, it was already mentioned that an increased familiarity of a user with a product or system may change the perception of the same (cf. Hassenzahl, 2003). In getting used to a product, users should experience for instance less frustration in using it but also less stimulation since the product is not new anymore (Karapanos et al., 2009). Learnability (as part of usability) as well as novelty (as part of stimulation) are for instance two aspects that are especially important at the beginning of product use, but this seem to change over time when users become more familiar with the respective technology (Karapanos et al., 2008). Even though temporality matters aside of usability problems, and is often highlighted as significant aspect of HCI and UX research, there’s still a lack of studies taking dynamics of experience into account (von Wilamowitz-Moellendorff et al., 2006).

However, one study pointing in this direction is that of von Wilamowitz-Moellendorff et al. (2007), who assessed how users’ perception and evaluation of different kinds of products: mobile phones, computer tomographs and productivity software programs (MS-Office), change over time. For this purpose, they developed the interview technique CORPUS (Change oriented analysis of the Relationship between Product and USer) consisting of a structural and an episodical part. During the structural part, participants are requested to rate several quality statements (e.g., "How beautiful is the product?") at different times on a 10-point scale and to evaluate how those qualities might have changed from the beginning of product use to the end; complemented by an additional rating of the user’s own valuation of these changes (e.g., is it a question of continuous progress?). The used quality statements are primarily based on Hassenzahl’s model of UX and can be divided into five dimensions: utility and usability as pragmatic qualities, and stimulation, appeal and communication of an identity as hedonic qualities. In the second part, participants are asked to describe events in the form of episodes to explain from their point of view what might have changed their experience with the respective interactive product (so called change incidents).

Whereas the first part allows more learning about the change process with regard to the different quality dimensions (e.g., they increase/decrease over time), the second part enables finding out more about the underlying reasons of these changes. The results of their study showed clear differences in the quality perceptions depending on the product category that was evaluated. Concerning for instance the pragmatic qualities of mobile phones, the perceived utility remained stable while usability rapidly increased over time; and in terms of hedonic qualities, appeal as well as stimulation and identity decreased in the course of usage. One may assume that different
product categories probably show different patterns of change over time (cf. von Wilamowitz-Moellendorff et al., 2006), but the previous results are insufficient so far.

A critical point of the CORPUS analysis conducted in the study of von Wilamowitz-Moellendorff et al. (2007) is that it is exclusively retrospective. This is because participants are asked about a product after they have used it for a certain time, so that the results rely only on the users’ memories and that these are probably influenced by bias effects. Moreover, the change incidents each participant individually constructs are difficult to compare. A further study was conducted by Karapanos et al. (2008) who evaluated how user experience and evaluate an interactive TV set-top box at the beginning and at the end of use after four weeks. To assess UX they applied the AttrakDiff-2 questionnaire of Hassenzahl (2004, http://www.attrakdiff.de/) which is a semantic differential developed by Hassenzahl et al. (2003) to measure pragmatics as well as stimulation and identification by offering seven bipolar attributes for each of the three quality dimensions; plus an additional item to assess appeal. Instead of measuring how the three qualities change over time, Karapanos et al. (2008) wanted to find out, which qualities determine a product’s goodness or beauty and how this develops over time. Their results show that at the beginning goodness was influenced by pragmatics, but over time, identification became more and more relevant. With regard to the product’s beauty, stimulation seemed to be the determining quality at the beginning, whereas identification takes its place after four weeks. Following this, the importance that we attach to the different qualities of UX in interacting with a digital product seem to be influenced through time.

Problematic concerning the design of the study is on the one hand that it involved just one product and only 10 subjects, and on the other hand that the assessment of the users’ perception were measured once at the beginning and at the end so that intermittent changes of the same were not directly encompassed (Karapanos et al., 2008). Beside, Karapanos et al. (2009) conducted an empirical study to figure out more about the way users experience products across time in taking the Apple iPhone as an object of investigation. Aside from using a short version of the AttrakDiff 2 questionnaire, they employed the Day Reconstruction Method (DRM), that asks participants to reconstruct their daily experiences at the end of each day by dividing it into continuous episodes (day reconstruction), and tagging these episodes with brief names. Subsequently, subjects are requested to pick out those three daily activities resp. experiences that are the most impactful (either positive or negative) and to write an explanatory story about them (experience narrative). After an in-depth qualitative content analysis of 482 collected experiences narratives of 6 included individuals, Karapanos et al. (2009) identified three brief and distinct phases of product adoption over time: (1) Orientation, (2) Incorporation and (3) Identification; embedded in a conceptual model of temporality of experience (see Fig. 12).
Beginning with the *anticipation* of certain experiences, leading to the formation of *expectations* about the product use (e.g. that it provides a desired functionality), *orientation* refers to the early experiences provided through the product (e.g., feeling of excitement/frustration, getting acquainted with the functionality, visual aesthetics of the object, design of interaction). In the phase of *incorporation*, long-term usability becomes more and more important (e.g. that the product is useful, satisfying, provides fast access to information). This phase reflects on how a product becomes meaningful in users’ every day lives, as routines developed (e.g. regarding the iPhone: to check for new emails every morning). Moreover, results of Karapanos et al. (2009) show, that people love routine aspects in their daily lives. They even propose to design for new daily rituals, and also *"to understand the impact of the forfeiture of these products once these have been embedded in habituated activities"* (Karapanos et al., 2009, p.737). In the phase of *identification*, people involve the object into their *social* life. The possibility to communicate parts of ones’ self-identity through it, which might either enable users to connect with others (e.g. being part of the iPhone user group), or to differentiate from them (e.g. being owner of a superior phone) turns it into a significant product with regard to users’ selves. Moreover, an identification with the object, and personalization of the same, could lead to the formation of a *personal* relationship with it. At any time, experiences provided through an object (e.g. stimulation, usefulness), and their distribution might change over time as they fade to differ-
ent adoption phases. The three main forces that motivate transitions from one phase to another are familiarity with, functional dependence of, and emotional attachment to the object of interaction. Results of Karapanos et al.’s study (2009) show, that an increasing familiarity with the iPhone led to less problems with regard to the learnability of functions, but also to less stimulation through the product and also an decrease of expressions of self-identity (e.g. to differentiate from others by owning an iPhone). Through the routinely usage of the product, people get functional dependent to it, and the incorporation in private and social contexts induces an emotional attachment to it, over time.

It is important to mention that participants’ emotional attachment to the product is highly depended on the type of product. The iPhone, even though functional orientated, can be seen as a very personal product as it allows to be connected for instance with other beloved persons as well as an social product since it communicates a certain status (Karapanos et al., 2009; Hassenzahl, 2003). However, one should not forget, that the study only involved six participants and that results were based on the evaluation of a single product. Other types of products, for instance tools (as primarily ACT products), or very SELF-related products have to be analyzed against the background of the model proposed by Karapanos et al. (2009).

In the scope of the present work we want to assess how participants’ experiences concerning the Lovers’ objects develop over time. How may an increasing familiarity with the boxes influence the perception of the different product qualities proposed by Hassenzahl (2003)? Are the Lovers’ objects indeed primarily perceived as SELF objects? Which of the qualities – pragmatics, stimulation, identification – are important to participants over the course of the project, and what are the underlying reasons? Which qualities might promote a prolonged use of them?

How far do the three phases proposed in the temporality of experience model by Karapanos et al. (2009) appear within the present Lovers’ study? Is the first phase of interaction characterized through orientation, when participants start to get more familiar with the objects? How do they incorporate the objects into their daily lives? Do the objects become social, emotional and personal meaningful to participants, so that they identify themselves with them over time? Since the functional role of the Lovers’ objects will be kept open to participants from the beginning, it will be interesting to find out, which function they’ll anticipate and expect through the interaction.
2.5 Resume

The present work started with an overview of the current state of human needs in HCI. The shift from a mainly goal- and usability-oriented discipline to a more holistic approach to human-technique interaction was demonstrated, putting humans and experiences in the middle of design purposes. Moreover, two holistic perspectives on HCI were presented, taking in particular emotions and pleasures into account through the design and interactions. Furthermore, related work on intimacy via technology was introduced, since one of the aims of the Lovers’ project is the support of fundamental human needs for belongingness and intimacy to a significant other, and thus individuals well-being. The work pays particular attention to couples in new romantic relationships, as they provide a rich source of individual experiences and emotions, and do much to fulfill these essential needs. Against the backdrop of social exchange theories, the work also tries to explore romantic relationships through the creation, giving and receiving of video messages via technology. In this regard, it is hoped that the couples involved in the Lovers’ study regularly interact in an intimate, meaningful, fair and reciprocal manner through the exchange of positive and self-thought-out video content. At best, the exchange might increase the joint outcome of the relationship, which is an important determinant of relationship satisfaction and might foster individuals commitment to it. Moreover, the content creation and presentation might stimulate reflection and communication on and within the dyad. Through the videos, individuals can, for instance communicate how they think and feel about the partner and the relationship, and display meaningful shared experiences, emotions or memories. This requires, however, decisions to be made on the content, empowering subjects to highlight relevant aspects of their relationship. Thus, it is not a designer who decides which content will be appropriate to display, it’s the individual, with her/his own intentions, values, believes and aims, who determines and controls the theme of reflection and thus the presentation of the partnership. For example: On which topics do individuals invite their partner to ruminate? How do the partners represent each other through the messages? What do the content and the exchange reveal about the relationship? How does the exchange influence their interpersonal behavior and the partnership in general? Which roles do communication and routines play in this regard? Accordingly, I suggest to see the Lovers’ objects as technological probes (Hutchinson, 2003), since an observation of individuals’ interaction could assist us - as researchers - in better understanding larger social and communication behaviors within romantic relationships, and beyond, help us in learning more about the social nature of technology as well (Hutchby, 2001).

In order to address wider people-product relationships with personal emotional significance, a deeper understanding of the way that people experience
interaction with technological objects is needed, but also of the roles that such artifacts can play in people’s everyday lives. For this purpose, the user experience model of Hassenzahl was presented, introducing especially the hedonic qualities stimulation and identification through and with interactive products. It is hoped with regard to the Lovers’ objects that people are stimulated through the important video content of their partner and identify themselves and their relationship with the box, as they embed their personal experiences within it; even over the long term. A relationship to the artifact might be supported through its incorporation in their relational life as they might build routines around the exchanges. In this regard it would be further interesting to see how individuals perceive the box, which roles they assign to it and what kind of personal functions they anticipate with it. The design and purpose of the artifacts should therefore be open to enable multiple co-existing interpretations through individuals. Thus, meaningful relationships, emotionally intimate content, an integration and exchange of the objects within couple’s relational everyday life as well as mean making processes according to the objects role and purpose could enable an enduring and significant attachment to these artifacts.

Figure 13: Lovers’ interaction process as affective loop.

Figure 13 subsumes the core aspects of the explorative Lovers’ study by adopting Höök et al.’s (2008) concept of an affective loop. Individuals reflect on and invest in their relationship by creating video messages for the beloved person in cooperation with a media artist. The content is presented through
the Lovers’ box and communicates something about the relationship. The personal perception of the message in turn not only stimulates reflection on the relationship, on the Lovers’ box and its role, but might also evoke communication about the video and the partnership as well. Moreover, through the content individuals might be stimulated, experience emotional closeness and intimacy, which again could support their needs and well-being. This could also influence how satisfied with, and committed to their relationship they are. Affective responses to the interaction with the Lovers’ box might increase individuals emotional involvement with the Lovers’ objects over time. The couples might create a routine around the exchange in their natural relational environment, identify themselves and their partnership with the box, assign individual meanings, and thus get emotionally attached to it; an artifact with incorporated technology.
3 The Lovers’ Project

According to the theoretical background, we used craft techniques for the physical production of four sets of Lovers’ objects (box and key) as well as for the technology inside them, with a view to create new experiences of digital media without the objects being perceived as conventional ‘digital’ devices. The aesthetics of the design and the nature of interaction with the Lovers’ objects is purposeful and seeks to avoid assumptions and expectations that we might associate with traditional consumer electronics.

3.1 Design and Configuration of the Lovers’ Objects

The design concept of the Lovers’ objects was built upon the idea to create technological artifacts that are open for participants to complete, and enable the assignment of their own roles to them. The Lovers’ box for instance is a square wooden box, and thus, a familiar object that suggests a number of uses (e.g. storage box, sewing box) yet can not be narrowed down to a specific category, genre or time era. The box and key were intentionally designed to not evoke a particular expectation about their purpose, but rather to invite participants to personalize them through their own actions and sense making (cf. Wallace, 2007; Gaver & Benford, 2003; Sengers & Gaver, 2006; Zimmerman, 2009). Moreover, in combining familiar mechanisms (RFID technology, key-lock mechanism) in a novel manner, we hoped to achieve an appropriate trade-off between ambiguity and usability (Höök et al., 2008; Sengers et al. 2005).

![Figure 14: One of the Lovers’ boxes: a) closed and b) opened with a key on top.](image)

Every Lovers’ box consists of two same sized wooden halves with an antique escutcheon at the front and surrounding ornate carvings. When unlocked with a unique key, the box opens in a book-like manner, and a screen becomes visible (see Figure 14). To minimize the usual connotations of digital displays the screen is covered by a wooden passe-partout with rounded edges.
- thereby looking less like a laptop and more like a pool people can look at.
A PC with an integrated Phidget RFID Reader (CITATION) is hidden under
the wooden board in the right half. The aesthetics of the box are emphasized
by deliberately hiding all technological elements. Thus, not only screen and
computer are enclosed by wood, even the wires that connect the two sides
are encased in a fine leather channel so all but the screen itself is hidden for
viewers. Equally, all LED lights were covered with black tape to make sure
that no parts of the technology rest visibly when the PC is turned on. The
computer is configured so that nothing appears on the screen of the software
until it’s running. To avoid evoking the sense of a wooden laptop-like device,
the videos created by participants, are not played in a typical 9:16 horizontal
format on the screen, but rather view rotated 90°, in a portrait orientation.
In each of the boxes there is a VIA ARTiGO A1000 Pico-ITX computer built
in with a LinITXPlus 7 VGA Widescreen (16:9 and resolution 800 × 480).
The box is turned on by simply attaching its power cable. The system uses
two flash drives for memory rather than a hard disk, this saves space but
more importantly allows power to be interrupted without causing damage
to the software or hardware when the box is unplugged.
The operating system Puppy Linux is used with a C application interpreting
the Phidgets RFID input and playing media using VLC. The software parses
an XML configuration file which holds a list of known RFID tags and associ-
ated media files. We chose video as the media format as it allows the scope
and flexibility not only to present text and pictures, but beyond moving pic-
tures and sound as well as a combination of these. The configuration file also
allows restrictions to be placed on the time window, dates and amount of
times a media file can be played (e.g. just once, just in the evenings between
6pm and 7pm, as often as wanted), these the so called parameters of interac-
tion, giving participants further opportunities to individualize their content.
The software also logs all actions (e.g. starting up, playing a file) as well as
the time and date at which these occur. The operating system and software
are on the first flash drive which is set read-only in hardware. The media
and configuration files are stored on the second flash memory in a partition
set to be read only in software and the log file is stored on the second flash
drive in a partition marked read-write (J. Thomas, personal communication,
July 20, 2009).

The box’s key is made of five components (see Figure 15): an RFID tag that
is glued into a black plastic fob, a key hoop, a physical key to unlock the
wooden Lovers’ box and a fine leather band that connects fob, hoop and
the physical key. Fob and hoop are again blank objects participants can
customise by painting on them, putting fabric between them (like an em-
broidery hoop), attaching them to their key rings, and wear or carry them
as intimate objects on their body (cf. digital jewellery by Jayne Wallace,
2007). Hence, the Lovers’ key encompasses two kinds of keys: a physical
one to unlock the box and the fob, which, when placed on the right half
of the box, triggers a stored video message. Since the screen remains black until the computer is fully booted up, the software is configured to play a start-up sound to demonstrate to participants that the box is on standby and ready to be used.

3.2 Participants

The study involved five Caucasian couples in new heterosexual relationships spanning between 4 and 8 months in duration. We chose couples that find themselves in an early stage of their relationship and who are thereby more concerned with the rewards and costs that they obtain through it. That is, they will typically be more careful in attending to future outcomes of the relationship and are more concerned with the positivity of their exchange balance (Levinger, 1980). Furthermore, early relationship stages are characterized by a particular uncertainty; being less likely to anticipate the other’s behavior correctly leads to disruptions that are likely sources of emotional experiences (e.g. surprise, passion, disappointment, fear). Inevitably these are more intense at the beginning of a relationship, but decrease over time as both partners become more familiar with each other. Hence, one may assume that this first period of the relationship is more dynamic and exciting with regard to emotional intimacy, since it offers both partners the opportunity to discover new information about one another (Sternberg, 1997). Moreover, initial phases are governed by a rule of social politeness (Guerrero &
Andersen, 2000), as people display more positive emotions, which suits our intention to stimulate a positive exchange via technology. Furthermore, the relational idiosyncrasies that arise within these relationships may serve as an authentic opportunity to weave technology or digital objects into their daily lives.

The mean age of the participants is 21.4 \((SD = 4.427, \text{min} = 17, \text{max} = 30)\). The results of an application of VECA scales show that all ten participants are very familiar with different computer applications \((M = 29.10, SD = 6.173)\), and have been using a computer since the age of 10.2 years \((SD = 3.706)\) on average. The average computer use per week is 36 \(\frac{1}{2}\) hours \((SD = 17.488)\). Concerning the educational level, the participants have on median 10 post-16 GCSEs \((\text{min} = 6, \text{max} = 12)\) and 3\(\frac{1}{2}\) post-18 A-Levels \((\text{min} = 0, \text{max} = 5)\).

According to results of the Relationship Assessment Scale (RAS; Hendrick 1988; Hendrick, Dicke & Hendrick, 1998), all participants are extremely satisfied with their relationship \((M = 8.733, SD = .644)\); none of them reaches a critical RAS score below 7. Regarding Sternberg’s Triangular Love scales, participants report, that they are very committed to their relationship \((M = 8.725, SD = .967)\), and perceive it as passionate \((M = 7.977, SD = .904)\).

Additionally, all relationships are characterized by a high degree of general intimacy \((M = 8.757, SD = .803)\) as well as relatively high emotional and intellectual intimacy \((M_{\text{emotional}} = 7.652, SD_{\text{emotional}} = 1.151, M_{\text{intellectual}} = 7.850, SD_{\text{intellectual}} = 1.377)\) (PAIR Inventory, Schäfer & Olson, 1981).

3.3 Instruments and Measurement

3.3.1 Initial Questionnaire

The initial questionnaire is designed to assess some demographic details such as the age, gender, education level, and the current occupation of participants. To gain information about their familiarity with computer applications and their computer usage habits in general, the initial questionnaire encompasses several items of Richter, Naumann and Groeben’s VECA (Vertrautheit mit Computeranwendungen [Familiarity with computer applications] which is part of the Computer Literacy Inventory INCOBI, 2001), translated into English, to assess computer literacy. Participants are asked to judge how familiar they are with certain applications (e.g., multimedia applications, text processing, Internet, graphic programs) compared to other people of their age, and to specify how many years they have been using a computer and how many hours, on average, they spend each week using it. Additionally, the questionnaire includes items of the Relationships Assessment Scale (Hendrick, 1988; Hendrick et al., 1998) to measure relationship satisfaction. The RAS is a brief and well-established 7-item measurement of general relationship satisfaction which is not only applicable to married
couples but to many types of close relationships (Hendrick, 1988; Banse, 2003). Validity analysis of the RAS (Hendrick 1988; Hendrick et al., 1998) showed significant correlations with measures of love, self-disclosure, sexual attitudes, commitment and investment in a relationship. Hendrick et al. (1998) reported a good test-retest reliability of .85. The RAS assesses how well the partner meets one’s needs, how satisfied one is with the relationship in general, how well the relationship is compared to most, how often one wishes not to had got into this relationship, to what extend the relationship meets one’s original expectations, how much one loves the partner and how many problems exist in the relationship. Moreover, the RAS is an effective instrument to predict if couples stay together or split up. Results of a study conducted by Hendrick (1988) disclose a predictive ability of 91% for couples that stayed together and 86% for those who split apart. This indicates, that the RAS could serve as a useful device to identify couples whose relationship is at risk of splitting apart. Therefore, it would be reasonable to apply the RAS to check the probability that the chosen couples for the project stay together until the end of it. On the original scale, answers can be given on a 5-point scale reaching from 1 (low satisfaction) to 5 (high satisfaction) (cf. Hendrick, 1988). In the scope of the present study, the scale is extended to a 10-point one to gain more precise information, and to gently push participants to show preference in one direction (either by tend more to agree or to disagree). By applying the results of Hendrick et al. (1998) on the transformed scale, scores over 8.0 would presumably indicate satisfied partners, whereas scores around 7 for men and between 7 and 6 for women could be a sign of substantial dissatisfaction and a greater relationship distress. Additionally, the questionnaire encompasses some items of Sternberg’s Triangular Love Scale (1997) to gather the current state of intimacy, passion and commitment/decision to the relationship of each partner. From the 15 items of Sternberg’s scale for each of the three components, eight are taken that were more relevant to the project. Items pointing in the same direction are reduced and those that are concerned, for instance, with shared possessions and physical contact between the partners are left out to diminish the total amount of items to a sufficient minimum. The items chosen to assess intimacy, decision and commitment to the partner and the relationship are shown in Table 1.

Further, to gather more detailed information about the participants’ degree of intimacy, the six items of the two sub-scales concerning emotional and intellectual intimacy of the PAIR Inventory (Personal Assessment of Intimacy in Relationships, Schaefer & Olson, 1981; see Table 1) are added. Following Schaefer and Olsen (1981) this inventory can be applied to all kind of heterosexual dyadic relationships (e.g. friendship, dating couple, married couple), and at all levels of the relationship. The PAIR inventory includes five areas of intimacy: Emotional intimacy (e.g. closeness of feelings), social intimacy (e.g. common friends, similarities in social networks), sexual in-
Table 1: Items of the initial questionnaire to assess the dimensions general intimacy, passion, decision/commitment, emotional and intellectual intimacy (Sternberg, 1997, p.318; Schäfer & Olsen, 1981, pp.53-54).

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Items</th>
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| Intimacy                | I communicate well with my partner  
                          | I share deeply personal information about me with my partner  
                          | I have a warm relationship with my partner  
                          | I feel that my partner really understands me  
                          | I received considerable emotional support from my partner  
                          | I value my partner greatly in my life  
                          | I experience great happiness with my partner  
                          | I feel emotionally close to my partner                                                                                                           |
| Passion                 | I find my partner to be very personally attractive  
                          | I would rather be with my partner than with anyone else  
                          | My relationship is passionate  
                          | I cannot imagine another person  
                          | There is nothing more important to me than my relationship  
                          | My relationship is very romantic  
                          | I cannot imagine life without my partner  
                          | There is something almost 'magical' about my relationship                                                                                       |
| Decision/Commitment     | I view my relationship with my partner as a good decision  
                          | I know that I care about my partner  
                          | I feel a sense of responsibility towards my partner  
                          | I plan for my relationship to continue  
                          | I will always feel a strong responsibility for my partner  
                          | I am committed to maintaining my relationship  
                          | I have confidence in the stability of my relationship  
                          | I view my relationship as permanent                                                                                                               |
| Emotional Intimacy      | My partner listens to me when I need someone to talk to  
                          | I can state my feelings without him/her getting defensive  
                          | I often feel distant from my partner  
                          | My partner can really understand my hurts and joys  
                          | I feel neglected at times by my partner  
                          | I sometimes feel lonely when we’re together                                                                                                     |
| Intellectual Intimacy   | My partner helps me clarify my thoughts  
                          | When it comes to having a serious discussion it seems that we have little in common  
                          | I feel ‘put-down’ in a serious discussion with my partner  
                          | I feel it is useless to discuss some things with my partner  
                          | My partner frequently tries to change my ideas  
                          | We have an endless number of things to talk about                                                                                               |
timacy (e.g., general affection, sexual activities), intellectual intimacy (e.g., sharing ideas), and recreational intimacy (e.g., shared interests in hobbies). Against the background of the present study, the emotional and intellectual intimacy sub-scales are most likely to provide additional useful information. The original inventory is meant to be used to assess how participants perceive their current relationship and how they would like the relationship to be with regard to the different intimacy dimensions. In the scope of the present study, it is only interesting to see how the partner’s perception of the relationship is at the beginning as well as at the end of the project (see Section 3.3.4, concluding interview).

All items of the different scales (RAS, Sternberg’s Triangular Love Scale, PAIR) are transformed into statements that could be answered on a 10-point Scale reaching from 1 (extremely disagree) to 10 (totally agree).

### 3.3.2 Diary

Tollmar and Persson (2002) who developed the 6th sense as well as Kaye (2004) who created the PIO and VIO devices (see Section 2.1.1.3) used either daily logbooks or open ended diaries to assess participants’ individual experiences with technology. According to these approaches, diaries are developed to detect how participants evaluate the messages directly after they have received them from their partner. Subjects are encouraged to reflect on the obtained messages by answering three questions: (1) *Tell me about your thoughts and feelings regarding the piece this week,* (2) *Please share with me how personal the message felt for you this week,* (3) *Please share with me how much you liked the message in general.*

Whereas the first question aims to assess participants’ emotional and cognitive response, the second is meant to encourage them to write something about their perception and judgment concerning the level of intimacy (including e.g., personal information or self-disclosure) of the content. In order to Bradbury and Fincham’s interaction model (1989; 1995) the subjective interpretation of the received message and its affective consequences immediately after the processing stage is tried to assess (named by me as *immediate behavioural reaction*) to capture their initial felt experience, while reducing retrospective biases (cf. Karapanos et al., 2009). Following Rusbult’s investment model (1983), the last of the three questions printed in the diary encompasses how rewarding they perceived the message to be. For this purpose, they are given a set of star stickers at the back of the booklet and asked to express how much they liked the message by adhering up to five stars at the bottom of the double page (see Figure 16).

To make sure that the documentation of their intimate personal thoughts and feelings is kept secret, they are asked to seal each entry using the glue strip attached at the side of the right page. Furthermore, they are instructed to fill out the booklet regularly, to make a note of the date at the top of each
page and to bring the diary back at the end of the project. The content of the diary would only be made available again in the interview at the end of the project and would not be shown to the partner.

3.3.3 Checklists

Each week, participants are requested to fill out one of five checklists after they have created a message for the partner, with questions concerning (a) the perceived user experience with regard to the objects of interaction and (b) the effort participant’s put into the content creation. The first part of the checklist is developed to assess subjects perception of the pragmatic and hedonic qualities (e.g. stimulation, identification), and their change over time. For this purpose the items of Hassenzahl’s et al. (2001; 2003) semantic differential, the Attrakdiff2, are used (see also Burmester et al., 2002). This differential encompasses seven opposing items for each of the three product quality dimensions: Stimulation (e.g. standard - creative, boring - exciting), identification (e.g. isolating - integrating, cheap - valuable) and pragmatics (e.g. unwiedly - manageable, complicated - simple). Some items of the English version of the AttrakDiff2 specified by Hassenzahl (2004) are slightly renamed to either shorten them or to improve their comprehensibility (e.g. lame is replaced by boring, unruly is replaced by unwieldy). Aside of the employment of the AttrakDiff2 questionnaire, four additional
bipolar items are included to identify overall judgments of the objects *beauty* (unsightly - beautiful), *significance* (non-significant - significant), *personal reference* (impersonal - personal) and *emotionality* (rational - emotional) (cf. Karapanos et al., 2009). All items can be rated on a seven-point scale, while the order of the AttrakDiff2 items as well as the four supplementary ones is counterbalanced across all checklists to eliminate sequence effects. The first of five checklists encompasses additionally one open question about the participant's first impression concerning the Lovers' objects. Through the checklists, it should be possible to detect how the perceived product qualities may change over time, how these potential changes are shaped, and if they are for instance steady from the beginning to the end. If distinct changes emerge, participant are going to be asked in the concluding interview what these changes may have caused (cf. CORPUS interview technology of von Wilamowitz-Moellendorff et al., 2007).

In the second part of the checklist, participants are requested to share some information about the creation of the content to quantitatively assess the degree of costs each week (e.g. effort of time, thoughts) (cf. Rusbult, 1980; 1983). They are questioned to specify *how many hours they have spent, before coming to the Lab, in creating the content, how long they have thought about it in general, and at which date they got the idea for the content*. Additionally, they are asked to indicate overall how much effort they think they put in the creation of the message on a five-point scale reaching from 1 (less effort) to 5 (lot of effort).

### 3.3.4 Concluding Interviews

In concluding interviews at the end of the project, participants are asked about their experiences through the interaction with Lovers' box and key, how they perceive the objects and feel about the project. The DVD in Appendix B provides an overview about all interview questions. According to the main topics presented below, the interviewer started first with general, open-ended and less leading questions that become more precise in the course of questioning. Moreover, questions are developed to encourage participants to disclose personal information and feelings by asking them kindly for instance to *share experiences* with the interviewer, and to *tell her more* about certain aspects; within a casual chat in a hopefully trustworthy environment.

#### Usability, UX, Parameters and Object Customisation

Beside asking about the perceived usability (e.g., easy of use, error freeness) and perceived user experience with box and key and how these may have changed over time, participants are requested to express how they feel about the usage of the interaction *parameters*, the change of the start-up sound of the box, and if they ware the key or changed its appearance (cf.
Investments in, and Intentions for the content

To get information about the investments each participant put into the message creation, they are asked to share how they tried to express themselves through the objects, where they got the idea for the content from, which intentions they had with regard to the partner, if they shared personal information about themselves through the messages or tried to support their partner emotionally (e.g., making him/her laugh, helping him/her to relax, saying to other that one loves him/her). Equally, these questions aim to gather detailed information about potential self-disclosure behavior, social support through the messages as well as experienced intimacy (cf. Rusbult, 1980, 1983; Sternberg, 1986, 1997; Schäfer & Olsen, 1981).

Message Liking and Content Perception

To evaluate the outcomes of the messages received, participants are asked to share how they experienced the partner’s messages in general as well as how they liked them, if they learned something new about their partner, found the messages moving, personal or intimate, were looking forward to get them, felt valued, felt understood or emotionally support through them (cf. Sternberg, 1997).

Reciprocity, Equity and Fairness

To get information about the level of perceived equity, reciprocity and fairness with regard to the exchange process, participants are asked how they see themselves as trying to be fair in creating messages and if they see the partner in the same way. Additionally, they are asked to describe their contributions to the messages as well as to the project, and to compare them to the ones of their partner (cf. Larson et al., 1998; Cate et al., 1982).

Exchange Process and Routines

Moreover, they are questioned to describe how they exchanged the messages each week, if they saw for instance the messages together, how they maybe integrated the objects within their relationship, and if they developed some kind of routine or ritualistic exchange while given and receiving the messages of one another.

Communication

Participants are requested to divulge whether they talked about the mes-
sages or the project in general (see meta-communication, Watzlawik et al., 2003). They are questioned as to the the reasons for talking about them, if there was something unexplained they might have tried to solve through communication, and if there were ever disagreements about the content.

**Influence on Relationship and Significance of the Objects**

Additionally, they are asked if the exchange process and the interaction with the Lovers’ objects had in any way an influence on their relationship and how this might have appeared, and if they would have liked to create more messages or continue with the exchanges if the project had not come to an end (cf. Jordan, 1998). They are questioned moreover, about whether they missed the objects for instance when the partner had them, showed them to friends or family members, and found them in some way meaningful for themselves or their relationship. Participants are asked if they can assign a role to the objects as the objects’ purpose is left open from the beginning. To help participants to articulate themselves, they are asked to give the objects a name (cf. Kaye, 2004), and to propose a time era in which the Lovers’ artifacts would fit in the best.

### 3.4 Procedure

Subjects were recruited through posters, flyers and personal contact, e.g. speaking to couples sitting in romantic parks at sunset. All couples who met the screening criteria (being in a new relationship between 4 and 8 months) and who were interested in taking part in the research project were invited to a paid first meeting (£20 each). Initial meetings were prepared for seven couples. However, just five couples attended the initial session over the time of recruiting. During this meeting they were given a detailed description of the procedure and were shown a mock-up of the wooden box. After being told about the study requirements and the large effort involved with the project (e.g., that it is necessary that each partner comes around to Culture Lab once a week to create a message, that they have to see each other regularly, that they’ll have to keep a diary and that they’re asked to participate in an interview at the end) all partners who decided to take part were independently requested to complete a consent form and the initial questionnaire. Moreover, they were allowed to choose - as a couple - one of three different key hoop shapes (see Figure 17) as a first step to personalize their Lovers’ key. All five couples agreed in taking part in the project. Moreover, they were all satisfied with their relationship (depending on the RAS scores), and showed interest in and openness for new experiences with ’technology’.

During the course of the project, participants were asked to come to Culture Lab once a week to create a message for their partner over a period of five
weeks. In doing so they collaborated with a skilled digital media artist helping them to create a video that satisfied their requirements. Before the very first session, all participants were given a short briefing with ten suggestions of ideas what they could create for their partner to help them get started; for instance: *Share with your girl/boyfriend something funny about yourself, a favorite place, something your partner doesn’t already know about you or a special experience.* Additionally, they were given a sheet of paper with some webpage URLs of free media databases where they could find several pictures, sounds and videos in case they wanted to look something up or create something on their own before coming to the actual meetings (see further DVD in Appendix B). Besides, a training session for the media artist with an uninvolved volunteer was conducted to train the artist to contain herself by not leading participants in any direction. Additionally, the training provided information about the restrictedness of certain file formats that have to be readable by the computers built in the Lovers’ boxes, and if it is possible to create a video message in the given time (within 1 hour).

The Culture Lab appointments took on average 1 ½ hour and were audio recorded. During the session, the box was turned over to an experimenter to take out the memory stick, save the log files and to hand over the stick to the media artist to transfer the new message. At the end of each creation session, the memory stick was build back into the box and tested by the media artist in a separate room, so that the participants did not get a look inside of the box to keep their awareness of actual technology to a minimum. While the content was transferred to the box, participants were questioned by an experimenter about the creation process itself, if they had already an idea in mind when they came to the Lab, about their intentions with regard to the message they created, and how they thought and felt about the previous given to them by their partner (what they liked and disliked). Afterwards, participants were given the respective checklist to fill out. Finally, participants were given the box with the new content, thanked and accompanied out.

Figure 17: Key hoop shapes: a) plain, b) half curved, and c) fully curved.
After one created a message for her/his partner, it was the other one's turn. The creation sessions were scheduled in the way that one partner comes to Culture Lab at the beginning of a week (on Mondays or Tuesdays) and the other one at the end of the week (on Thursdays or Fridays), so that there were always a few days in between enabling the partners to see each other, exchange the box, reflect on the previous message and to come up with an idea of what to create next. Of the five couples included in the project, it was randomly chosen that the males started with the creation of a message three times and the females twice.

The actual process took place over five weeks. After the first week, two couples decided to end the project ahead of time, and a third couple dropped out a week later. Of these three couples, two were not able to continue because of unforeseen job restrictions of one of the partners, and one couple ended their relationship. Those participants who were involved only within the first week, were invited to a short casual interview with cookies and tea/coffee, and asked about their experiences with the project and reasons for ending it. It was not possible to get in contact again with the female of the couple whose relationship broke. Her diary as well as information that would have been collected through a short concluding interview are therefore missing. Those three couples remained in the project beyond the first week (n = 6) were invited to a paid concluding interview (£20 each). Additional to the questions presented in Section 3.3.4 (see also DVD in Appendix B), the information given in the diaries were used as prompts for discussion. Moreover, as help to classify the idiosyncratic messages created by each participant, they were asked to make an order of the partner’s messages specifying which ones they liked the most, and which they found the most personal. In the same way, they were requested to order the messages they made for the partner with regard to the extent to which they found them meaningful as well as personal.

Even though subjects did not receive financial compensation for their participation in the project all were offered drinks and snacks every now and then during the sessions, were allowed to keep their Lovers’ key as well as a DVD with all the messages they have created during the project. Moreover, the video message each participants liked the most was filmed while playing in the box and given as in addition to the disc.
4 Results

This Section starts with a brief description of the content that was created by participants in cooperation with the digital media artist, and provides information about the frequency of applied additional box features (start-up sound, box’ parameters), the amount of times the created videos were watched and what they criticized with regard to the process requirements. In the following, the perceived usability and user experience of the Lovers’ objects is examined, not only with regard to initial ratings but also over the time of interaction. In particular, results relative to the human needs for stimulation, intimacy and belongingness will be presented. The consecutive part of the results is concerned with the influence of the Lovers’ objects on the couple’s relationship: their communication as well as exchange behavior. This Section closes with the roles that were assigned to the objects, if they are perceived as ‘digital’ and had become meaningful in participant’s lives. Qualitative data were analyzed respecting Grounded Theory (Scott, 2009; Glaser & Strauss, 1967).

4.1 Content Creation process

4.1.1 Created Content

Over the course of the project 27 videos were created. Of these videos, eight are slide shows of pictures, eight are videos of either the participants

<table>
<thead>
<tr>
<th>Created messages</th>
<th>(frequency)</th>
<th>example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slide show of pictures (2)</td>
<td></td>
<td>Pictures of the couple</td>
</tr>
<tr>
<td>of pictures with Text (6)</td>
<td></td>
<td>Pictures of penguins and giraffes + text annotations</td>
</tr>
<tr>
<td>Video of media database (3)</td>
<td></td>
<td>Videos of blackbirds</td>
</tr>
<tr>
<td>of oneself (2)</td>
<td></td>
<td>Participant singing and playing the piano</td>
</tr>
<tr>
<td>with text (3)</td>
<td></td>
<td>Text as introduction to the following videos</td>
</tr>
<tr>
<td>Montage of pictures and video (7)</td>
<td></td>
<td>Videos + pictures of a festival</td>
</tr>
<tr>
<td>of pictures and video with Text (1)</td>
<td></td>
<td>Written introduction to a video of the band ‘The Cat Empire’ + included pictures</td>
</tr>
<tr>
<td>Animation (2)</td>
<td></td>
<td>Animated stick man drawings</td>
</tr>
<tr>
<td>Stopmotion (1)</td>
<td></td>
<td>60 consecutive pictures of Ana</td>
</tr>
</tbody>
</table>
or taken from several media databases, eight are montages of pictures and videos, and three are own creations such as an animated stick man or a stop motion video. All videos included sound, and ten included text as well (e.g., a personal message, explanatory annotations). The duration of the videos spans between 7 sec and 513 sec and is on average $M = 155.07$ sec. A structured overview of the content created with a brief example for each category is given through Table 5.

### 4.1.2 Start-up Sounds and Box’ Parameters

After each content creation session, participants were asked if they changed the start-up sound or the time parameters of their Lovers’ box. The start-up sound was changed in total 10 times, whereas the box’ parameters were modified just 5 times. The ratio between the amount of created videos and the additional box features over time is visualized in Figure 18. Since three couples dropped out of the study, the amount of videos made decreases continuously. Nevertheless, participants inserted the functional features more often in the course of time as they got more familiar with the creation process. Expressed in percentage: of all videos made, in the first week of interaction 0% included additional box’ features, in the second already 60%, and 75% in the third, fourth and fifth week.

![Figure 18: Ratio between the amount of created videos and the frequency of start-ups sounds and box’ parameters changed over time.](image)

Moreover, the information of participants provided in the creation sessions, and in the concluding interviews about their intentions with regard to the
additional box features were analyzed. As a result, the start-up sounds chosen by the participants were mainly unrelated to the video messages and used as an extra to surprise the partner; "it makes it more spontaneous and more personal" (Ana). Sounds were with $M = 6$ sec on average very short ($\text{min} = 2$ sec, $\text{max} = 13$ sec), and were either bits of comedy or parts of songs (e.g. Jim Carrey, 'Plug in Baby'), animal sounds (e.g. seagull, a big growl), a system sound or jingles (e.g. 'Welcome to the dance charge system', pipes) or something to welcome the partner in a personal way (e.g. 'Hello hello hellowoo', 'Hey Nico'). Nico, Kate and Lucy mainly found it "funny" to add new sounds, whereas Jim preferred it not to change the sound to often and to treat it more like a "ring tone" for the box, where just certain sounds would be appropriate, so that "it makes a specific sound and you know that sound means (...) that the box is going to open".

Through the box' parameters participants had the chance to individually determine when the video can be watched by the partner. Moreover, it was open to them how many videos they created and how they would schedule them. Of the five times, this feature was used, participants decided two times to set the video that it can be played only on a particular day, once on a particular day but just in the morning between 9 and 12, yet another time on a particular day but just once at all, and further, two videos were made, where one was available only in the morning and the other one only in the evening of a particular day. Even though this feature was meant to provide a high potential with regard to participants own creativity, and were appreciated as a good idea (e.g. Nico, Lucy, Ana), some experienced it more as a restriction rather than a beneficial addition. Nearly all participants (n = 7) liked and preferred it most, when the partner was allowed to see the messages whenever s/he wanted; to keep it a "bit more flexible" (Ana). Jim ascribed the restrictedness to the requirements of his day- and work live. For him, "time is a pressure" so that "you have to just make sure it's available for whenever". Lucy arguments in the same line, saying: "I didn't change the timing -um- cause Jim is working so I don't know when he gets time to watch it", and Julia states equally: "He can see it any time, 'cause, I don't wanna say he can only see it on an evening 'cause he's got such a busy schedule". Those couples who nevertheless gave the box' parameters a try, experienced it indeed as restrictive to watch a video just once or between a certain time span, and would have preferred to be able to watch it again (e.g. Ana, Nico). At the same time, this restrictedness was described by Ana as an "intense" experience: "I think that adds to the sentimental value of it, being able to just keep it for that little moment kind of thing. You have to put your full attention on it and appreciate it for what it is", and of Nico, regarding the multi video option, as "surprising".

To sum up, the additional box' parameters were just barely used by participants. Even though they were perceived as "special feature" (Lucy) especially for messages that would be somehow time dependent (e.g. a birthday
message), their restrictive character seemed to inhibit a more frequent application.

4.1.3 Watched Frequencies

The descriptive data shown in Table 3 indicates that on median the created videos are only watched by the participants twice during the first three weeks of interaction and just once during the last two weeks. The maximum frequency a video was watched is $max = 10$.

Table 3: Descriptive values concerning the frequency the created videos ($n = 25$) were watched over the course of interaction.

<table>
<thead>
<tr>
<th>Week of interaction</th>
<th>N</th>
<th>Median</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>9</td>
<td>2</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

4.1.4 Co-Creation with the Digital Media Artist

We asked participants how they experienced it to work with the digital media artist (Laura) to create messages for their partner. All uttered that they liked working with her and acknowledge her friendly personality and open mindedness. The artist was described as "helpful" (Nico) and "approachable" (Julia). Moreover, it was acknowledged that she "does listen really well" (Ana), that she's "really professional" (Julia) and that it was "really fun" (Phil) to work with her. Whereas everyone appreciate it that the artist was available for help with the realisation of their individual wishes, she occasionally helped out with ideas as well, when participants couldn't come up with an own elaborated concept (e.g. Nico and Ana). A critical aspect, since Ana for instance criticises that "sometimes she [the artist] gets so wrapped in her ideas that mine would sometimes get a little bit overshadowed (...) so sometimes it was more her than me".

In general, participants liked the co-creation process and to see how the video was made. Lucy for instance said: "It was kind of good to see stuff being put together as well. Because I've not done any sort of video editing, so it was cool to see how stuff slotted together", and Phil mentions: "It's really nice having somebody who can do that [editing videos]. Kind of where you can come up with an idea and then they would go yes, this is what you need to do to make it simple and in reality it would work".

That there was an artist between the dyad was perceived as help with regard
to the creation process, but also as a disturbing factor concerning the degree of intimacy of the content. Jim noted in this regard:

Jim: 

"(...) if we could have done the video ourselves. I wasn't saying that I don't like Laura or her advice kind of thing, but if we could have done that then maybe it would have been a lot more personal."

This 'privacy aspect' differs between participants. Julia and Phil did not have any problems with being open about their ideas and their relationship while collaborating with Laura. They uttered for instance:

Kitty:  

"I think...because...Laura was so friendly, and, just approachable and kind of, happy with anything that I wanted to do (...), she made it very easy to forget about, the content, and that someone else was viewing some personal content I...I don't even think I considered that it was just, natural, Laura was helpful and lovely, and fun, and...I think open minded enough to deal with whatever I had come at her really so...that was absolutely fine, I don't have any, like, secrets from her kind of thing or didn't feel like she was offended by anything".

Phil:  

"Actually I'm not particularly shy about stuff like that so I don't mind. Because it's like a third person who you don't, you feel a confidence in her. (...) There's like a kind of safety of telling her this is the idea or what I want".

Overall, the media artist and the collaboration with her was mainly perceived as helpful. The fact, that the study was conducted by some kind of university department and the friendliness and openness of the involved parties gave most participants the feeling that they can trust in the project, whereas others perceived the third persons as intervention with regard to the content creation.

4.1.5 Critique

Over the course of the project and within the concluding interviews participants criticized some aspects of the creation process as for instance, that they had to come around once a week, and that making the video is a lengthy procedure (e.g., Jim, Jamie). The time requirements of the projects were a central problem for some couples. It was the main reason for two couples to end the project ahead of time. Jim for instance said: "It [to come to the Lab] was easy some weeks and hard some weeks for us to do". Moreover, the partners had to exchange the box between the appointments. Non of the couples were living together, which made it even more complicated. Especially Julia and Phil, who saw each other only on weekends, took a lot
of effort to meet additionally during the week. Therefore, some participants (e.g. Jim, Julia) proposed to extend the project, so that it’s just one person making a message per week or even per month.

Beyond, the size and the heavy weight of the Lovers’ box were criticized. To carry the box, the key and the electric cable was described as "uncomfortable" (Jim). Moreover, Julia and Ana mentioned that they were a bit afraid of breaking or damaging the box, especially at the beginning. Further advices with regard to the box were a) to enlarge the screen, b) to shorten the time it takes the computer inside to turn on, and c) to improve the sound quality of the speaker.

4.2 Usability and User Experience

4.2.1 Ease of Use vs. Technological Difficulties

When participants are asked how they thought about the interaction with Lovers’ box and key, all acknowledged that the interaction was very easy. Joey for instance said: "(...) it’s just as simple as opening it up and switch it on...so it’s pretty good" and Nico mentioned about the interaction: "(...) it was really easy because you just had to put a key on and...it played!

Even though we tried to develop robust objects to interact with, 3 of 5 couples reported technological difficulties that mainly appeared within the first week, and that were fixed immediately. The kind of problems and the way these particular difficulties were solved in each individual case is schematically shown in Table 7 in Appendix A. It merits particular attention, that one of the participants, Phil who is familiar with technology, fixed the box himself when it did not turn on properly to see his girlfriends’ message.

4.2.2 User Experience of the Lovers’ Objects

A quantitative analysis of the 7-point semantic differential values of the initial checklist concerning the evaluation of the Lovers’s objects (box and key) in the first week of interaction shows that they are perceived as providing hedonic qualities such as identification \( M = 5.657, SD = .755 \) as well as stimulation \( M = 5.138, SD = .748 \), whereas its pragmatic quality is just moderately developed \( M = 4.757, SD = .983 \). The application of a Kolmogorov-Smirnov test shows that the mean values do not significantly differ from a normal distribution (identification: \( p = .983 \), stimulation: \( p = .910 \), and pragmatics: \( p = .918 \)). Moreover, the calculation of Pearsons’ correlation coefficients indicates that identification and stimulation highly and significantly correlate \( r = .750, p = .012 \), whereas there is only a non significant moderate correlation between identification and pragmatics \( r = .510 \), and a week non significant correlation between stimulation and pragmatics \( r = .319 \). A following variance analysis of repeated measurement shows a significant difference between the three user experience dimension
To clarify where these significant differences occurred, paired t-tests were applied. Result show that mean values of identification are significantly higher than those for stimulation ($t(1,9) = 3.091, p = .013$) and those for pragmatics ($t(1,9) = 3.197, p = .011$). The values for stimulation are on average higher than those for pragmatics, even though this difference is not significant ($p = .271$). The means of all 21 items grouped according to the three UX quality dimensions across all participants ($n = 10$) are visualized in Figure 19.

Aside, the ratings of the four additional items (significant - non-significant, rational - emotional, impersonal - personal, unsightly - beautiful) indicate, that the Lovers’ objects are initially perceived as moderately significant ($M = 4.8, SD = 1.687$), and moderately emotional ($M = 5, SD = 1.247$), but clearly evaluated as very personal ($M = 6.2, SD = .919$) as well as beautiful ($M = 5.5, SD = 1.179$). These quantitative results are in line with initial statements of the participants (all names changed) describing the aesthetic of their Lovers’ box, for example:

Ana: “It’s a lot more decorative than I thought it would be....I like how it’s got the fancy little lock and the carving on the side, it’s quite pretty”.

Figure 19: Mean values for all items for the product qualities a) identification b) stimulation and c) pragmatics.
Julia: "I thought the box was absolutely beautiful in terms of its colour, lock and decoration. I am very impressed with the level of craftsmanship".

When participants were questioned about their initial perception of the Lovers’ objects it appears that women emphasis the objects’ beauty (Ana, Julia, Lucy, Sarah, Luisa) and design (see also the statements above) while men appreciate in particular the tactility of the box (Phil), the unexpectedness to see a screen when the box gets opened (Nico) or just find the usage of wood and technology interesting (Jim). Phil for instance said about the box:

Phil: “I like the tactility of it. It is very touchy.”

Phil: “(...) it [the opening the box] felt like a book cover opening or something and then you had some feeling of it. And that what was nice about the locking and the key thing, it wasn’t just a radio wave or not something that sets something off, it actually felt like it was mechanical and a quite old fashioned safe kind of feeling.”

Not only Phil valued the box’ tactility, Jim also stated that "feeling something is much better" in the interaction with good bits of technology.

Furthermore, a non-significant tendency in evaluating the objects becomes apparent between the ratings of men and women, showing that those of the females are slightly more favourable than those of the males (see descriptives values in Table 4).

Table 4: Mean values and standard derivation of males and females depending on the four additional product qualities.

<table>
<thead>
<tr>
<th>Product quality</th>
<th>Gender</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Significance</td>
<td>male</td>
<td>4,00</td>
<td>2,121</td>
</tr>
<tr>
<td></td>
<td>female</td>
<td>5,60</td>
<td>0,518</td>
</tr>
<tr>
<td>Emotionality</td>
<td>male</td>
<td>4,60</td>
<td>1,342</td>
</tr>
<tr>
<td></td>
<td>female</td>
<td>5,40</td>
<td>1,140</td>
</tr>
<tr>
<td>Personal reference</td>
<td>male</td>
<td>5,80</td>
<td>1,095</td>
</tr>
<tr>
<td></td>
<td>female</td>
<td>6,60</td>
<td>0,518</td>
</tr>
<tr>
<td>Beauty</td>
<td>male</td>
<td>5,40</td>
<td>1,517</td>
</tr>
<tr>
<td></td>
<td>female</td>
<td>5,60</td>
<td>0,894</td>
</tr>
</tbody>
</table>

Regarding the mean values of the participants that participated in the project over the full five weeks (n = 4), both statistical tests, the Friedman test as well as a variance analysis of repeated measurement, could not indicate significant changes over time neither with regard to the three UX dimensions nor according to the four additional items. A visualization of the hedonic and
pragmatic qualities of the Lovers' objects over the course of five weeks is given in Figure 20. The run of the curves reveals that stimulation increased over time, whereas identification is relatively stable and pragmatics decreased. The four additional product qualities (see Fig. 21) equal over time. More-over, the rated significance, emotionality and beauty of the Lovers’ objects slightly increased, while the personal reference of the objects decreased.

Figure 20: User experience dimensions over time.

Figure 21: Additional product qualities over time.
4.2.3 Support of Fundamental Human Needs

4.2.3.1 Need to Belong: Positive Social Exchanges with the Beloved

All participants expressed anticipation of the handover of the Lovers' box to them, and that they were always looking forward to see new messages from their partner; four of six participants even said that they were excited to watch the video. Ana for instance described her experience when she got the box from her partner as: "(...) curiosity and I was excited to see, like I always looked forward to seeing what he did". If possible, most of participants saw the messages always together with their partner (e.g. Nico, Ana, Jim, Lucy), but none of them told the other in advance what the content would be about. Lucy described her experiences about the actual exchange as follows:

Lucy: “So it was kind of exciting, but we didn’t tell each other anything about what the messages were going to be. So it was like you generally had no idea until you watched it. And even at the end of some of the messages it was still a little bit surprising, we had to watch them again”.

Julia said in this regard: ‘I mean I’d thought about, what it could be [Phil’s message] and I just really didn’t have a clue but I’m sure he probably felt the same, when he received it from me’.

The content was always unknown to participants as if it is considered a "present" (Julia) that is packed in wrapping paper and stays covered until it got unpacked by the recipient. Additionally, the play with start-up sounds and the occasional change of box’ parameters might have stimulated this favorable suspense as well (see in detail Section 4.1.2). In this positive regard, uncertainty could be seen as a fundament for surprise or excitement, and also for a sense of anticipation. Phil described his experience with the box when he received a message as:

Phil: “(...) quite nice, because you get a little sense of anticipation, for that 90 seconds, rather than it just being there. (...) You’re acting waiting and it’s like an event”.

But what are the important factors which make sure that the exchange is perceived as "an overall positive experience" (Julia) that is "enjoyable and (...) kind of very special between you and your partner" (Julia)? What makes it so "satisfactory" (Phil) to put the Lovers’ key on the corresponding box?

The positivity of the experiences is related to the video content participants
created. After the creation session with the digital media artist, participants were asked about their intentions with regard to the video they made for the partner. Accordingly, all messages stemmed from positive intentions, as for instance making the other one laugh, helping her/him to relax, to surprise the partner, and the hope that the partner will like the message, and gets the relevance of it (see further Table 5). Most of the videos created were meant to be funny or included some kind of “personal joke” (Julia) between the partners to make sure that the other one will “get a positive reaction out of it” (Ana).

Table 5: Different intentions for the messages, and frequency they were uttered.

<table>
<thead>
<tr>
<th>Intention for the partner (frequency)</th>
<th>example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make the partner laugh (16)</td>
<td>Hope s/he'll find it funny, S/he'll laugh about it</td>
</tr>
<tr>
<td>Hope that the partner will like the message (9)</td>
<td>Hope s/he'll like it</td>
</tr>
<tr>
<td>Hope that the partner gets the relevance of the message (6)</td>
<td>Hope s/he'll gets why it’s relevant, Hope s/he’ll spot the hidden message, Hope s/he’ll get the song, hope s/he’ll find it personal, Hope s/he’ll finds it interesting</td>
</tr>
<tr>
<td>Surprise the partner (5)</td>
<td>Hope s/he’ll get a nice surprise, Something different from the usual, hope s/he’ll be excited</td>
</tr>
<tr>
<td>Help her/him to relax (2)</td>
<td>S/he’s so busy the video shall help her/him relax</td>
</tr>
<tr>
<td>Providing a memory for the partner (1)</td>
<td>There is a photos that provides a memory for her/him</td>
</tr>
<tr>
<td>Making fun of the partner (1)</td>
<td></td>
</tr>
<tr>
<td>Not to disappoint the partner (1)</td>
<td></td>
</tr>
<tr>
<td>Intention unknown (1)</td>
<td></td>
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Moreover, participants reported that they were sometimes inspired by the content of their partner’s videos and tried to respond to it (e.g. Lucy, Ana). When asked if they had a special theme within their message exchanges, amongst other things, they mentioned common experiences, a shared belongingness to nature, music, a playful emphasizing of things one of them loves or hates, or solely something funny. The exchange process was not only dominated by reciprocal response behaviors, rather participants tried
to stimulate and surprise each other by changing the topic occasionally. For example, when asked what inspired a particular video, Lucy responded: "It’s something new, cause I think we’ve done a lot of, um, responses so I thought I do something different".

Despite the positive intentions, of all 27 messages that were made, 4 were not liked, because they either included embarrassing pictures of the receiver that were originally meant to be funny (e.g. Nico: "all of them [the messages of his girlfriend] are positive apart from one which has embarrassing pictures of me"), because they weren’t the way it was expected (e.g. Luisa: "I thought it would be about us"), or the receiving partner did not understand the personal relevance of the video. Disappointed expectations become for instance apparent in the statement of Lucy saying: "I think I thought some of my messages were funnier and more interesting that they probably were. So it was a bit sad when he didn’t think they were interesting". Participants tried to solve disappointments like that through a) attribution of variable external factors like partner’s time requirements (Lucy: "I assumed that he was quite busy"), b) focusing on positive aspects of the message (Nico: "She was being mean but in a nice way", Jim: "I think some people are unhappy when they get presents that they don’t like. But usually you’ve just got to think it’s the though that counts"), or c) showing understanding for the partner’s disappointed reaction: If the receiving partner does not like the message of the giver, the giver admits that s/he did not like the message either, and that it’s quality or content should have been better. Ana said in this regard:

Ana: ""If one of us had a negative reaction to it, like the one who was meant to be seeing it. The person who’d made it always tried to be like oh yes, well, I never thought it was that good. Trying to cover up like trying, look like a less of a fool kind of thing (...). Or try and be like oh yes, well I didn’t think it was that good either, trying to agree".

If negative emotions aroused beyond the examples displayed above, they were in particular related to technological difficulties that occurred mainly within the first week of interaction. Participants reported, that they “felt disappointed" (Julia) or found it “frustrating" (Lucy) that the partner couldn’t see the video and spend time with it. This shows moreover, that participants were not only interested in receiving a positive message from their partners and having "enough time with it" (Julia), but also wanted that the effort they put into the content for the partner is appreciated and liked by the other. Due to technological problems, Julia for instance was so disappointed that Phil couldn’t see the message she’d made for him, that he repaired the broken box on his own. He said about fixing their broken Lovers’ box: "’cause she wanted us to get the experience as well of it and obviously, she’d spent time and effort, to do that and it’s like I wanted to get it as well like I wanted to actually see like fully what she’d done and hear what she’d fully
done which was quite important to us". Equally Ana wanted her boyfriend to like the message, she sometimes even watched the videos she made for him on her own, like "a sneaky preview" (Ana), before she handed over the box, since she "always wanted to try and do something that was good to watch" (Ana). Beyond, even if the intentions were always positive, some participants were "kind of apprehensive that the other one ... would or wouldn't like it [the message]" (Julia), as they were aiming for positive reactions (cf. statements of Ana above).

Overall, the exchange and the messages were liked and positively experienced. This is also indicated through answers given by participants when asked if they would have liked to continue with the exchanges, since all except one declared that they would have liked to continue with it. Julia for instance said: "I was thinking about it [the project] constantly, and I’m, in fact I’m still thinking about it, I’m thinking ‘Oh what would we have done?’ or ‘What would I have done next?’", and Lucy stated: "Oh, we wish we could spend longer on it". The only one (of all nine participants that were interviewed at the end) who did not wanted to continue was Jamie. Even though he liked the message his girlfriend Sarah made for him, he said: "I didn’t see the point of really making this [project] to be honest". He expected more out of the messages (that they would look better, be something else than sideshows, be more about the relationship), and therefore seemed not to be as motivated to take part as Sarah. In other couples, both partners saw a benefit in taking part. Positive reciprocity seems to be important in this regard, as Julia describes her motivation for instance with: "I would like a nice surprise and hopefully Phil will get a nice surprise". Moreover, she appreciated the project by saying:

Julia: "(...) it was nice to be able to, give something, you know or put effort in -um-, which I mean we do in other ways as well I mean Phil’s a great cook so he’ll cook on Friday night and...I’ll, do something for him in return like...I don’t. I can’t really think of it, buy him a new plant or something like that [laughs] you know we do try and do, do nice stuff for each other -um-, but I guess this was the ideal solution to that ".

The social exchanges via the Lovers’ objects stimulated the giving and receiving of personal presents, something that the partner made for oneself (Nico), and that had even more significance than material ones (Julia). The gift-giving character of the exchange is pointed up through another statement of Julia saying that Phil and her also thanked each other for the messages.

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2 Jamie belongs to one of the couples that ended their participation after the first week
During the creation sessions, participants were asked to specify if the video they made for their partner was personal. According to their own declarations, of all videos made, 21 were meant to be personal, 3 were not personal at all, and 3 could not be clearly classified. Moreover, 10 videos included personal material such as pictures of the participants, audio recordings of their voices or videos of themselves (e.g. a stopmotion video with sequential pictures of a participant, a video that shows one of the participant singing while playing the piano). One might assume that the usage of personal material lead to a mere liking of messages, as they are perhaps more personal or meaningful to participants. This assumption could not be confirmed quantitatively. A t-test for independent samples shows, that the liking of the messages (given through the star stickers in the diaries) was not significantly influenced by the personal reference of the media material. Over all, those videos that included personal material got on an averaged $M = 3.6818$ stars whereas those without any personal materials were given $M = 3.4667$ stars on average. Since those messages that exclusively used stock sound-, picture- or video ($n = 17$) focused on shared experiences of the couple (e.g. joint visit of a wedding or festival, a reminder of the first date), personal moments, things they anticipated to do together in the future (e.g. moving together, traveling), something humorous (e.g. personal jokes), or things that the receiving partner likes (e.g. a favorite actor/movie/comedian or football player); it seems to be the contents’ overall message that determines the liking of the video.

All videos, except of one whose content information were incomplete (diary missing), were classified based on the audio recordings during and after the creation sessions as well as the diary entries according to four categories: the receiver perceives the messages (1) as non-related to the couple or one of the partners ($n = 3$, e.g. an exploding whale), (2) as exclusively related to the partner (other, $n = 6$, e.g. just pictures of the partner), (3) as related to her-/him-self alone ($n = 9$, e.g. flash-animation of pictures showing the receiver), or (4) as related to the couple or both partners ($n = 9$, e.g. videos and pictures of things they made/experienced together). The videos are classified independently by two raters. To measure the homogeneity between the two ratings, Cohen’s Kappa for inter-rater reliability is applied. Results show an inter-rater reliability of $Kappa = .949$ which is with $p < .001$ highly significant, and demonstrates an outstanding consensus between the two ratings. Following, an univariate analysis of variance was conducted, but no significant difference between the four categories could be identified. However, descriptive values, visualized in Figure 22, reveal a tendency that a mere relatedness of the content to one of the partners (especially to the receiver), and ideally to both as a couple, leads to a higher liking of the message.
More informative in this regard are the rankings participants were asked to make during the concluding interviews. Results show that those two or three messages were on top (liked the most), that were also ranked as the most meaningful and the most personal; this pattern was found over all participants that stood in the project for the full five weeks. Therefore, the liking of the messages might be influenced by the degree of personal reference and meaningfulness of the content. In some videos "there were very personal things in" (Jim) or they were sometimes even "very intimate" (Phil), which becomes also apparent through the following statements of participants:

Julia: “(...) the words were kind of...very personal and there was quite a few sort of in...or private jokes in there that, nobody else would know what they meant but, um, yeah I just thought I’d combine trying to tell him, that he does mean a lot”.

Lucy about a message she got from Jim: “(...) it felt very personal as the ideas that were in it were quite significant for us, but they’re unlikely to have been understood in the same way by anyone else watching it”.

Phil: “(...) you know it’s just sending you a message but, it’s not. ’Cause it’s tuned and, it’s for you, it’s like I was saying before it’s not like that kind of randomness, there’s no randomness and there’s no, it’s not remote, it’s all about you (...). It is nice to have somebody talking about you or, doing something FOR you”.

Figure 22: Degree of message-liking depending on the four content categories.
In the statements of Lucy and Julia, both say that the messages included private jokes, or were unlikely to be understood by others in the same way; they obviously used their own private codes of communication. In one video Julia put in a slide where "Friday club" was written on. She explained later, that this is how Phil and her call Fridays. Since they see each other normally not within the week, they both look forward to the weekend, that they spent together and which starts on Friday. Jim also stated that the personal information are those, that just Lucy understands. With regard to the messages for his girlfriend, he said: "I suppose you know that they're all personal 'cause they are all, -um- you know, they’re all videos that maybe, that you don’t understand that Laura [the media artist] doesn’t understand, -um-, not, not because of anything else, but because (...) it’s an insider joke or whatever".

How personal the messages were, that participants created differed along the couples. Whereas one couple merely made funny videos, that were just seldom very personal, romantic or intimate, another couple made indeed very personal messages, to show the partner that "she is always a thought in my head" (Phil) or to give the other one "a greater insight to how I feel about him" (Julia). As described in Section 4.1.4 about the co-creation with the media artist, the degree to which the messages were personal and intimate was also influenced by the circumstances of the project. Ana for instance said: "(...) we never did anything that was really ridiculously intimate or personal. Which isn’t due to lack of an intimacy between us, it’s just that, I don’t know, we’re just not the kind of people who would put something on there [the box] that we felt shouldn’t be seen by other people".

Some participants who took the risk and included personal information in their messages, reported that they felt understood through the messages of their partner (e.g. Lucy, Julia, Jim, Ana). In addition, simply the receipt of a personal message from a beloved person was what "felt like a nice quite warm experience" and was described as: “It’s like having the person there with you" (Phil). The exchange and the project was perceived as something positive, as "interesting" (Lucy), "fun" (Ana, Nico, Lucy), "nice" (Phil) and "enjoyable" (e.g. Jim, Lucy, Julia). The closing statement of Nico in the interview integrates some of these statements by giving the advice:

Nico: “You should make the box into a real product (...) 'cause then everyone else will get to experience it. Well, I had loads of fun making videos and getting videos off Ana (...). The box was awesome”.

4.2.3.3 Promotion of Subjects Well-Being

That the giving and receiving of messages is important and rewarding to
participants becomes also apparent in a statement of Ana: ‘You’ll watch it again, if you’re feeling a bit low or whatever and you think oh that makes you laugh, then it’s nice to have that little pick me up’. Moreover, the boxes might be perceived as objects that allow the support of subjects well-being, Phil and Joey for instance explain:

Phil: “If you’re having a crap day and you know you’ve got something nice you can look at, that kind of makes all the difference. If things don’t go well, if the computers are all crashing and you losing loads of stuff. And then when you get home and you open it, it’s like yes”.

Phil: “You switch off [from the work day] and have something to look at which you actually want to look at, rather than having to look at it or being told to look at it or something else”.

Joey: “(...) everyday [is] being different, and you don’t know where you stand with someone (...) when you talk to someone you just talk (...) but that was very...you know, different, and -um- it just made me feel a lot more wanted than I thought so it’s kind of -um- a good thing”.

The messages embedded in the Lovers’ box were mainly of positive and meaningful content that the beloved partner made to make the receiver laugh, that the receiver likes, that helps her/him to relax (cf. Section 4.1.1), to feel valued or emotionally supported through the partner. Lucy wrote for example about a message in her diary: "This message was made to cheer me up when I felt ill and it definitely worked". Some messages included even the words "I love you" (Julia, Ana). Therefore, receiving a message can be as if: "(...) you just come out of it with a big smile on your face" (Jim).

4.3 Exploring Couple’s Relationships

4.3.1 Satisfaction, Intimacy, Commitment and Passion

Participants were given certain scales to assess relationship satisfaction, the three love components of Sternberg as well as emotional and intellectual intimacy at the beginning of the project, and at its end. The mean values according to these six scales for those three couples that took part in the project beyond the second week of interaction are shown in Table 8 in Appendix A. If values according to the scales changed at all, they differ just slightly (mainly far less than one point on the 10-point scale) and in different directions depending on the couple. Therefore, no meaningful changes or patterns become apparent. The degree of satisfaction, intimacy, commitment and passion seem to be stable across couples, and over the course of the project.
4.3.2 Exchange, Equity and Fairness

This Section turn it’s attention to participants’ investments made through the message exchange process, and tries to discern if the partners’ investments are perceived as equal and fair.

Participants were asked after each session with the media artist, how much effort they put into the creation of the content on a 5-point Likert scale. Positive correlations between the effort-rating, the hours spent on the content in general, and the hours participants thought about the content before they came to their sessions were found. All correlations as well as the significance levels can be seen in Table 6. As expected, the hours participants generally thought about the content highly significantly correlate with the amount of hours they thought about the content before the creation sessions \( (r = .629) \). Moreover, there is a slight but significant correlation between the hours participants thought in general about the content and the effort-rating \( (r = .406) \).

Table 6: Correlations between effort, general hours spent on content and hours spent thinking on content before the creation session.

<table>
<thead>
<tr>
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<th>effort Pearson correlation</th>
<th>hours (general) Pearson correlation</th>
<th>hours (before) Pearson correlation</th>
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<tbody>
<tr>
<td>effort</td>
<td>1</td>
<td>.406*</td>
<td>.259</td>
</tr>
<tr>
<td>sig. (2-tailed)</td>
<td>.036</td>
<td>.192</td>
<td></td>
</tr>
<tr>
<td>hours (general)</td>
<td>.406*</td>
<td>1</td>
<td>.629**</td>
</tr>
<tr>
<td>sig. (2-tailed)</td>
<td>.036</td>
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<tr>
<td>hours (before)</td>
<td>.259</td>
<td>.629**</td>
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<tr>
<td>sig. (2-tailed)</td>
<td>.192</td>
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*, correlation is significant at the 0.05 level (2-tailed).
**, correlation is significant at the 0.01 level (2-tailed).

Aside, after receiving the partner’s message, each participant specified how much s/he liked the messages by putting up to five star stickers in her/his diary. The effort made can be seen as costs to create messages, as it is, for instance, related to certain time requirements as shown through the correlations in Table 6 (hours spent thinking about the content but also: time needed to come to the appointments, preparation of content in advance, etc.), whilst the liking of the message can be seen as the rewards of received messages. Therefore, mean values were calculated for the effort each participant put in the content creation on average (as costs), and for how much the messages were liked on average by each participant (as rewards). The applying of a paired \( t \)-test including the dependent variables costs and rewards concerning the video-creation of all participants with a complete data set (n
shows that rewards ($M = 3.900, SD = .787$) are on average higher than costs ($M = 3.089, SD = .953$), even though this difference is not significant ($p = .072$). A following univariate analysis of variance shows that the females specified that they put more effort in the creation of the content ($M = 3.980, SD = .494$) than did the male ($M = 2.580, SD = .945$). This difference is significant ($F(1,1) = 6.931, p = .030, \text{part. } n^2 = .464$). Even though, the data indicates gender-specific differences according to the effort made, there are no significant differences between women and men in the degree the messages were liked (women: $M = 3.775, SD = .974$; men: $M = 4.000, SD = .707$). Descriptive values are visualised through the diagram of Figure 23.

Figure 23: Effort made (costs), and liking of the content (rewards) of the messages dependent on gender.

If we regard the effort as costs taken and the rewards given through the liking of the message over time, of the four participants that took part over five weeks, a repeated measurement of variance of the Factor costs, fivefold graded as within subjects variable, and gender, as between subjects factor, offered no significant changes over time. The same analysis was conducted for the Factor rewards leading likewise to no significant variances. The costs and rewards of females and males over time are plotted in Figure 24 and Figure 25. The bar diagrams show that even over time, females put equally or more effort in the creation of the content than did the men. Except of the last week of interaction, the males liked the messages on average equally or more than the females.
Figure 24: Effort made concerning the content creation of females and males over time.

Figure 25: Liking of the content made of females and males over time.
Moreover, as can be seen in Figure 26 the reward level of men is on average higher than their costs; only week five indicates an exception. The plot for the females (Figure 27) shows, that within the first two weeks, they get more out of the exchange than they put in, whereas during the last three weeks, they liked the messages they got less, but put more effort in the ones for their partner. Taking the visualisations given through Figures 24 and 25 also into account, it becomes apparent that the gender difference between the cost taken as well as the degree of rewards is equal or negligible small in the first two weeks of interaction. Difference in costs and rewards between man and women seem to emerge beyond these first two weeks as females put more effort in the content creation while men kept their level of effort constant.

Figure 26: Difference between effort and rewards of the males over time.

Participants themselves reported that they were initially unsure what to create with regard to the content, but got a better idea what to create over time (e.g. Jim, Lucy, Ana). Moreover, participants thought increasingly about the project and the content within their daily lives. Jim for instance said: "I suppose in some ways when I was on the Internet or maybe reading the newspaper, or I don’t know, watching the telly, I’d think oh that’d be quite good. But I wouldn’t maybe store it on a memory bank. (...) I did sort of think about it a bit more, but maybe it didn’t always transfer in". Some participants not only thought more about the project, they even made longer and more complicated videos at the end (e.g. Nico, Ana). Ana said about the effort she put in the content creation over time: "I think as it progressed I got more, I did more with it (...). Yes I think I pulled my socks
Figure 27: Difference between effort and rewards of the females over time.

up (...) I tried harder". Lucy on the other hand stated when she was asked if the effort she put into the content creation changed: "I think it did but I don’t think it got more or less going through. I think it sort of depending if I was really, really busy that week". In addition, Nico and Jim mentioned that they wanted the last video they made for their partners to be really good. Therefore, the effort participants put in the content creation varied along the project. It did not necessarily increase with the time, but depends on daily duties and responsibilities, and how high the project is on the priority of each participant.

In the concluding interviews, participants were asked if they experienced the exchange as equal between them and their partners. Participants either reported that both partners put equally effort in the creation of the content or that one partner contributed more. If one of them contributed more, the difference was low, since participants described it as "slightly more" (Lucy), "marginally more" (Jon), or "pretty much equal" (Ana). One couple agreed that both partners put equal effort in the project, even though they distinguished the level on which they contributed. Julia for instance said: "(...) his probably took longer to make than the things I made, but at the same time (...) I was thinking about it constantly". Another couple agreed as well concerning the effort made, in that the female contributed "a bit more" (Lucy). Even though her boyfriend agreed, that she marginally put more effort in, he ascribed it to weekly requirements, and distinguished different levels of effort as well, by saying that she put more physical and technical effort in (e.g. she brought in materials on a memory stick), whereas
he used his time to put more personal effort in some messages (Jim). He said: "I'd say, maybe it balances out 50/50, 60/40 on some weeks". On the other side, she justified her mere effort (or that her partner contributed less) by saying that she had more time to do the project. Participants not only take the individual time requirements of their partners into account in evaluating equity of contributions, but also discriminate between different levels of effort resp. contributions. Nico said that his messages were more creative, whereas his girlfriend mentioned that her ideas were better than his. Both Nico as well as Ana, remarked that they put more effort in on these particular levels than the other, but agreed that overall both contributed equally.

4.3.3 Influence on Relationship

4.3.3.1 Ritualistic Exchange as Additional Shared Activity or Part of Relationship?

Participants were questioned about how the interaction with the Lovers' objects might have influenced their relationship and how they integrated the objects into their daily lives. Those two couples that fully participated in the project over the course of the five weeks reported that the exchange became some kind of a "routine" (Nico) since they had to see each other regularly, or saw the messages for instance in the same places (e.g. Phil: "I did it on like the same place (...) a place where I'm happiest in the house maybe (...) it's a place where I do enjoy doing things"). Moreover, Ana, Jim and Lucy respectively said, that handing over the box, was the first thing they did, when they saw each other after one made a new video (see further box' anticipation in Section 4.2.3.1). Nico and Ana took turns, who had to come to whose's house to watch the message. She mentioned: "The day I have to see it he comes to my house and we watch it together. And the the day that he has to see it I go to his house and we watch it together". Nico explained, that the receiver of the message had a look on the screen, while the partner was sitting apart but was able to see the receiver's face and reaction. Lucy, of the other couple, describes it similarly: "We watched some of them together but we'd usually kind of like hand it over and we'd let the other person watch it on their own".

Over and above, Jim explained that the box sometimes even "became part of the relationship", whereas Lucy perceived the exchange more as an additional shared activity between them:

Lucy: "It was almost like something that we both did, I guess it was something, it was like another thing in common maybe. Yes, so in that way I guess maybe it reinforced. Even though I suppose we made the messages apart it was something that we did together".
For Nico, the exchange also "added something" to the relationship, "almost like a hobby", something that both partners do together. For Jim, it was another way of saying something to the partner, like "a different form of the same message", and since they both talk about some messages, those messages that were meaningful to them became part of the relationship. When asked, if the interaction with the Lovers' box influenced their relationship, Ana said:

Ana: "It [the box] was part of it, like oh we'll watch the box kind of thing. But it never influenced how we were that night or how we acted. We'd laugh about it or talk about it afterwards, than it was kind of like okay, we've watched the box now, I liked the message or I didn't like the message, and then we'd move on".

To sum up, for some participants the exchange had some ritualistic characteristics (e.g. to see the new message as soon as possible, at same places, in the same individual constellation). Moreover, the exchange was sometimes perceived as something that became part of the relationship, and as an additional shared activity of the dyad.

4.3.3.2 Communication Through, About and Beyond Messages

All three remaining couples reported that they talked about the messages; two couples even "always". They did not discuss the content in detail, but rather explained "different bits and bobs" (Phil), parts of the videos that were maybe not understood by the other properly (e.g. Julia: "I though he -em- might have heard the words [in a song she made for him]"), clarified the relevance of special things (e.g. Lucy: "(...)sometimes it was spotting a little image in the middle of it [the video], like the relevance of that (...) it was to clarify bits of what had happened"), how things were intended (e.g. Nico: "Ana didn't like read the videos as it was meant to come across so I had to explain"), said where they got the media material from (e.g. Jim: "Well we often talked about where we got the videos from"), and, in particular, if the partner liked the message (e.g. Sarah, Phil, Jim).

All participants told that they never ever had disagreements about the content, "it wasn't [something] there to like, have disagreements about" (Phil) (about handling of disappointments see Section 4.2.3.1). However, Nico for instance said that talking about the messages "was helpful because next week you could improve", and his girlfriend mentioned: "(...) sometimes we'd give each other pointers and be like oh you should have put that in the box not that, like trying to give each other a critique". This might support the idea that the partners assess the other one's personality or individual
taste a bit better. Moreover, Phil told that communication about the messages (as meta-communication), stimulated other topics about which they then talked. He said: "cause talking about the messages, we've been a lot more -um- communicative with each other. (...) it's led on to them kind of conversations like along that where we're just getting to know each other a bit better". Nico stated about the frequent contact and the personal videos they made for each other: "[It] brought us together more (...). I think it, like, let us understand our personalities more. 'Cause we both realised that we're quite humorous 'cause we always made humorous videos". The messages reveal information about what the partner is thinking, what is prominent in her/his mind, and how s/he is seeing certain things. Jim mentioned for instance: "I can tell that other things are on Lucy's mind though", Phil said about a message: "(...) it gives you like a snapshot into that person", for Nico, the box was like "a Gateway to Ana's mind", and also Ana "always looked forward to seeing what he did. I'm trying to put it, like curious about his ideas kind of thing. Because it is like putting a little idea of yourself into the box and then giving it someone really isn't it?". That this can be perceived as something positive with regard to the relationship, and the perception of the partner reveals the following statement of Ana:

Ana about a message from Nico: "At least he listens and remembers things I tell him. And I said I think it was very personal and it was nice".

Through the exchange, participants therefore did not only communicated through the messages, about the messages, but also beyond about other issues in their relational live. This supported, that the partners got to know each other a little bit better. That each message also communicates something about the relationship is described more detailed in the following Section.

### 4.3.3.3 Box as Reinforcer or Mirror of Relationship?

Two participants said that the exchange through the box "enforces what was there" (Phil) in the relationship, that it maybe "reinforced" (Lucy) what both partners already had in common, what they shared. In addition, Sarah mentioned that the exchange could "show how the relationship is progressed over the start of using the box"; as if it would be a mirror of the actual relationship.

The exchanges had mainly positive outcomes (as shown in Section 4.2.3.1), but one might imagine that they could receive opposite reactions. Phil described in this regard: "(...) if we hadn’t been suited to each other and just generally like that would’ve like, I could see that [the box] curtaining somebody’s relationship, not in a bad way just literally because it’s like kind
of would like, highlight aspects”, and further, "(...) it has been nice to do that [the exchange] you know, to actually get to know people, like I say it could’ve been a massive risk, and it could’ve gone all horrible”. Following these statements, the message exchange might be regarded as something that enforces or mirrors the relationship through the Lovers’ objects, in positive as well as negative directions. This might also explain the behavior of the couple that ended their relationship. The female of this couple, who initialized the ending of the relationship, came to her first creation session, after she received a message from her partner. During the creation session, she already complained about the message he made, and about his behavior in general. She said about his message: "I mean it’s obvious, he couldn’t think of anything (...) it was just photos of him (...) it showed how vain he is (...) I thought it would be about us, and he was just like, no it’s about me". She was disappointed about the message she got from him, she expected something different. During the session with the media artist, she also complained about him personally by saying things like "he’s so lazy", "he’s so moody", and "he sleeps all day". The message she made was about them, and their differences: He was described as a lazy, sleepy giraffe, and she described herself as a penguin that loves music and enjoys the sun. Moreover, she thought more about the content and put more effort in the video (she even brought own material into the session). The message exchange through the Lovers’ box could have reinforced or mirrored the already existing differences between them.

4.4 Personal Significance of the Lovers’ Objects

4.4.1 Customisation and Wearing of the Lovers’ Key

In the initial interview, participants were allowed to chose, as a couple, between three different hoop-shapes for the key (see Figure 17). Of the five couples, it was always the female that made the final decision for one of the shapes. The decisions were twice to the plain hoop, twice to the full curved one, and once to the half curved hoop.

The general idea of a common key to the box and the content was liked by participants. Phil said in this regard: "It’s a nice idea cause it keeps it really personal". Even though participants liked the idea of the individual box’ key and were aware that they can customize it’s appearance (e.g., paint on it, attaching fabric) or wear it (e.g. as a broach, in their pocket), just Lucy mentioned that she wore it around her neck for a bit. She and her boyfriend were the only couple that started to customize the key by making the connection between fob, hoop and physical key given through the fine leather bond a bit "freier" (Jim). Non of the couples attached fabric between hoop and fob. Ana said that they never got around to changing it, especially since it was something she shared with her boyfriend who had a different taste:
Ana: “I wasn’t quite sure what to do, like how to go about it, whether to put fabric on it, between it or not, because if it’s for the two of us we would probably not agree on how it looked, because we both have completely different ideas of what looks good and what doesn’t”.

What probably inhibited the decision to customize the key was that it should have been something that’s related to the couple as a whole and not just to one of the partners. Julia, who belongs to the couple that dropped out after the second week, said that she was looking forward to customizing the key by putting a special fabric around the hoop that was the material of a dress she got made, and of a tie her boyfriend got made when both of them were at a wedding. This material would have been something that both connect with each other as well as with a certain shared experience.

4.4.2 Perception as 'Digital' Objects

When participants were asked if they perceive the Lovers’ box as a digital object, they said, that the wooden appearance of the box, the tactility of it and the fact that it can be locked inhibited their expectations of digital elements within it. It is not perceived as a “new media thing” (Lucy) but rather as some kind of old “jewellery box” (e.g. Louisa, Julia, Lucy). As such, it is valued as a combination of an “old fashion interaction with the modern” (Phil). From the outside, the Lovers’ box is perceived as an antique solid wooden box with ornate carvings and a lock. Because of it’s vintage look, the box "seemed quite familiar" (Lucy) to some participants. Moreover, they would assign it to the Victorian era (e.g. Julia, Nico), to the 18th century (Lucy) or maybe to the 20s or 30s (Phil) of the last century. It’s something “old meeting something new” (Lucy), as if there were used "old materials and old ideas and ...you can do something quite new and innovative with it" (Phil). The box is not only ancient, "it’s new and old mixed together" (Ana). The screen inside, and the key technology are "quite up to date" (Jim). However, non of the six participants that were questioned in the concluding interviews primarily perceived the Lovers’ objects as ‘digital’ artifacts. Some answers on the question if the box is perceived as a digital object:

Jim: “No, I don’t think it is. It definitely isn’t I’d say. Just quite, well just the outside is quite old looking. I mean it’s got a wire to it but it sort of looks like a tail”.

Julia: “No, I definitely wasn’t kind of conscious of technology when I was watching the message or something like that”.

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But it’s not only the character of an antique box that impairs the perception of ‘digital’ elements within the objects, it’s also the unexpected interaction with them. Lucy said about the unusual usage of the Lovers’ objects:

Lucy: “The actual key to start the video is really new, and I don’t know how it works, I couldn’t guess. So it’s like they [box and key] are related but it doesn’t seem like they should be. (...) it’s quite weird, it is unexpected. It’s not in the context that you’d normally see something like that. So it’s strange, especially the first few times you watch it, because it doesn’t feel it [the screen with the video] should be there when you open it”.

Even though the interaction with the Lovers’ key is unexpected, it was also described as simple (see Section 4.2.1), and was liked by participants. Ana said for instance "I just like the movement of just putting it down, like a magnet (...) I like the trigger effect of it", but she disliked that it took quite a while for the technology inside to turn on completely. Yet this was an aspect that Phil appreciated:

Phil: “[The] waiting time just ’til it charged itself through that was, again quite nice ’cause it was like a like an event that you were waiting for it to do something, and give you something (...) rather than just you open it and just, taking the information out of it which was, nice to do, which is what I quite often miss out on now with all the techy stuff”.

Phil: “Like I get annoyed with my mobile phone when it won’t connect to the Internet straight away. (...) If you’re gonna sell us technology I want it to work properly and I want it to work exactly how I expect it to work (...) and [I] never got that like when I was like waiting for it [the box] to warm up ’cause it was kinda different to that, it wasn’t just a tool, it was something nice and..that..that’s the kind of feeling I got from it, it was just a nice feeling with the object, obviously nice messages as well like which kinda make all the difference”.

In conclusion, the Lovers’ objects, in particular the box, are not perceived as technological artifacts, and a lot of this has to do with the old and ornated look of the boxes, their tactility, the fact that they lock, as well as the atypical and intransparent way of interacting with them.

4.4.3 Individual Roles of the Lovers’ Boxes

Since the objects of interaction were open for individual interpretations of meaning, participants were asked in the concluding interview which role they assigned to the box. Julia and Phil perceived their box as a keepsake whose "function really is to keep something safe and precious" (Julia) like "some-
thing [that] you would hide under the bed and put away somewhere really, really carefully" (Phil). Similarly Ana said:

Ana: "I think it's a really good idea being able to lock it away, like have the option of keeping it in the box and putting it away. Where, for example, because you could do a video if it was a video tape, just now, and anyone could find it and watch it. It's being able to shut away and keep it private between you two without other people being able to invade it".

Some participants stored the box in their bedroom, since "it's like a personal item" (Julia) that belongs into "a safer place" (Phil). The box was either next to their bed (e.g. Jamie, Sarah, Julia), on participants desk (e.g. Nico, Lucy) or for instance on an old fireplace (Phil). Jim described the box he shared with Lucy as "a box of tricks"; for him tricks are associated with "magic". He explained that with regard to the box that "there's all sort of things going on in there" that you just don't know until you actually open it. Lucy on the other hand could not articulate a specific box-role, but explained her experience of it as "an older way of interacting" that is "in the same way really new". Ana perceived her Lovers' box as "a digital storybook, because it is like playing a little message that is part of your life". Moreover, her book-like perception of the box is underlined by the box' opening to the left, and a "never judge a book by its cover" expression. Equally her boyfriend described the box as an "interactive book (...) like a book with just moving pictures" (Nico). Joey in turn, compared the box with an adopted puppy that stays with the couple all time. He explained:

Joey: "(...) it [the box] sat by my side for the next to days, you know, it was just, I've only used it a couple of times but, but having it next to me meant I could use it whenever I wanted, so it was like...it was like when a couple gets to a certain point where they want to adopt a puppy and that puppy stays by them all the time".

It was not easy for participants to articulate a particular meaning, however, most of them found an individual role that they assigned to their box.

4.4.4 Meaningful Objects with Incorporated Technology

The box' storage of participants already showed that they treated their Lovers' box carefully as it is a personal artifacts that have to be kept safe, "because you do build up a slight relationship with it because you are gathering information through it kind of that you want to look at" (Phil). Five of the six subjects that engaged in the interaction beyond the first week even reported that the Lovers' objects became in some way meaningful to them. One couple (Lucy and Jim) ascribed the meaning mainly to the mes-
sages that were passed in the box, seeing the meaning of the objects merely in “their purpose and what they do and what’s inside them really” (Jim). Whilst one partner from another couple (Nico) reported that the five weeks of interaction, and the fact that they got used to the objects and integrated them in a routine of watching the incorporated messages, made the objects meaningful to him. As his partner described:

Ana: “When I do look at the box I think of the funny videos. You know how you can assume, you can associate things. I associate it with laughter and nice messages and closeness and personal intimacy and stuff. So I do view it as a very personal and positive... I look at it as a very positive thing for me”.

That the interaction with the objects as well as the exchange process lead to a meaningful relationship with Lovers’ objects is also apparent in a statement by Phil:

Phil: “(...) it’s not like mass market kind of thing. You, you would never feel that like, even though there could like a hundred million floating around, exactly the same design the same cut and everything like that, you would always feel that it was yours and hers kind of box (...). I say it is one of them things where you could quite easily become very very attached to it very very quickly and I think that was quite a nice thing to see”.

It is known, that six of ten participants showed their Lovers’ box to friends or family members. Some demonstrated the functionality and even showed the actual video, others just presented their box from the outside. Julia said: "I did show my parents the box (...). Even thought there was nothing bad on it I just thought, the content was private to me and Phil". Beyond this, all participants except for one reported that they will miss the objects.

Lucy: “I mean I know it’s only five weeks, but I think just because I’m used to it [the box] being there I think it would be weird for it not to be there”.

Phil: “It [the box] was lovely to play with and stuff like that and everything but you do love it and you do think ‘It’s only a box with messages on it’ but it is different to a box with messages on it at the same time so it’s quite nice. It’s quite nice to have, do that yeah. It will be missed from my end”.

To sum up, some participants got attached to the Lovers’ objects and associated positive feelings and messages with them. They treated their Lovers’ box carefully and kept it safe. Moreover, they showed the objects not only
to friends and family members, but rather reported that they'll miss them after the projects’ end.
5 Discussion

The results show that the Lovers’ objects are perceived as artifacts that are primarily related to a person’s self since they are valued in particular for their ability to stimulate, and as a source of identification, rather than for their pragmatic qualities (cf. Hassenzahl, 2003; Hassenzahl et al., 2001; Burmester et al., 2002). However, all three user experience dimensions: identification, stimulation and pragmatics are highly distinctive, demonstrating quantitatively that the Lovers’ objects are perceived as attractive artifacts. These results are also supported through participants’ initial perception of their Lovers’ box and key, as they value them as beautiful, decorative and tactile objects.

Moreover, the stimulation that participants experienced through the interaction did increase over time. This is in contrast to the results of Karapanos et al. (2008; 2009) and von Wilamowitz-Moellendorf et al. (2006; 2007) who analyzed the pragmatic and hedonic qualities of mobile phones and discovered that their perceived utility remained stable while usability rapidly increased over time (pragmatic qualities). The stimulation and identification that these consumer electronics provided at the beginning, decreased with usage. Whereas mobile phones can be primarily seen as products whose focus lies mainly on effective and efficient functional features, the Lovers’ box has a more distinctly human character and thus is readily adopted as a site for personally significant experiences. This might be traced back to the fact that subjects were co-creators of experience, as they create positive and personally meaningful messages for one another. The exchange was perceived as a process of giving and receiving personal gifts to and from the beloved person. Moreover, not only the video content, but also start-up sounds and boxes’ parameters provided opportunities to surprise and stimulate the partner each week. In contrast to the findings of von Wilmaowitz-Moellendorf et al. (2006; 2007) and Karapanos et al. (2008; 2009), the pragmatic qualities of the Lovers’ objects were less valued over time. This could be reasoned back to the simple interaction with the artifacts, encompassing only the two steps: (1) plug-in of the box, and (2) placement of the key to trigger the video content. Moreover, participants seemed to pay more attention to the content and the role of the box over time, than their functionality. These opposing results can be explained through two of Hassenzahl’s (2003) four different product types: While mobile phones for instance are primarily ACT products, targeted on the completion of tasks, their usability is more relevant over time, whilst their initial attractiveness becomes less important (Hassenzahl, 2001; 2004; Hassenzahl et al., 2003; Reeps, 2006). The Lovers’ box however can be mainly seen as a SELF product, as it is targeted on the couple and their individual experiences. The box’ enduring attractiveness develops not only from it’s initial appeal, but also through the personally meaningful messages, which provide stimulation over time, and support in-
individuals' identification with the box. As will be discussed later, some of the participants indeed got emotionally attached to their personal Lovers’ box, as they increasingly incorporated it in their daily life. Karapanos et al. (2009) and von Wilamowitz-Moellendorff et al. (2006; 2007) found that an emotional bond to technological artifacts is closely related to the type of product. All argue that the hedonic qualities rather than the pragmatics lead to an attachment, as they allow us to communicate certain qualities of our self-identity and our relationships to relevant others, as they might connect us stronger to the beloved partner, and that they might provide us with new, exciting or memorable pleasures. Thus, the type of product and how it is perceived (e.g., as SELF or ACT product) can be seen as one aspect that might support individuals emotional attachment to technological artifacts.

It was further argued that experience seems to be as much about what individuals bring to the interaction as about what the designer leaves there. As it was left with participants’ as to how their experience with the Lovers’ objects developed, participants within the Lovers’ project were empowered to be co-creators for their own personal experiences through technology (Dunne, 2003; Overbeeke et al., 2003; Hassenzahl & Tractinsky, 2006; Blythe & Hassenzahl, 2003). As was hoped from the outset, participants indeed created messages of positive and personal meaningful content for each other. All their messages stemmed from positive intentions as they mainly wanted the partner to like the video, to make the beloved laugh, surprise the other or helping her/him to relax. Moreover, they displayed certain experiences they made together, personal moments or things they anticipate to do in the future, as well as shared hobbies and activities, or simply something humorous through the messages. Accordingly, most of the messages were liked by participants. The fact that all participants anticipated the receipt of messages underlines the positivity of the exchange and qualifies it as a satisfying and rewarding experience. The beneficial potential of the Lovers’ objects within these exchanges became even more apparent as they were not only handed over to the person as a kind of singular material gift, but provided the opportunity to watch and experience the positive and meaningful content whenever wanted. This can be drawn from the statements of Ana and Phil who watched the videos to be cheered up again when they felt "a bit low" (Ana) or "had a crap day" (Phil). The warm, satisfactory and sometimes even exciting experiences they got from the interaction is embedded in their Lovers’ box and as this always available to them (cf. Olivier & Wallace, 2008; Hallnäs & Redström, 2001). Thus, the exchange of the Lovers’ objects was not only an opportunity for more frequent interaction with the beloved person (need to belong; Baumeister & Leary, 1995; Grau, 2003), but also a process of giving and receiving significant content through which one may feel loved, understood or emotionally supported by the partner (need for intimacy; Moss & Schwebel, 1993; Cunningham & Barbee,
2000; Schäfer & Olson, 1981; Larson et al., 1998). Accordingly, the present work gives a concrete example of how digital objects, if cast appropriately, can address human fundamental needs, emotions and experiences in a rich way, by offering individuals the opportunity to incorporate their personal experiences in a real world object - like a personal diary (Lindström et al., 2006) or love letter - using the technological benefits of modern times. It connects individuals to the significant other, gives them the opportunity to relive important experiences (cf. Eliot, 2009), and provides the potential to strengthen their emotional well-being. Even though the video messages were not watched very often by participants, which underlines the gift-character of the message exchange, they were always available if emotional support was needed; like love on demand.

Moreover, the Lovers’ box and the co-creation of video messages with the media artist, provided a good opportunity to motivate couples to reflect on their relationship (e.g. how to delight the partner personally). Some of the videos created indeed reflected elements of the participants’ life, aspects that they felt to be significant, that have personal meaning to them (cf. McCarthy et al., 2006). Reflection on the important relationship makes certain aspects of the same - for instance the beliefs, values or thoughts of each partner, or significant events and shared experiences from individual perspectives - conscious, and as such, provides new insights into the partnership (cf. Fleck, 2009; Sengers et al., 2005; Norman, 2004). In the scope of the Lovers’ project, it has been participants themselves who determined the content of reflection. The interpretative power through own reflective processes was left in their hands (cf. Höök et al., 2008), by making sense of the messages and the relationship to the beloved. This can be seen as a further advantage, especially compared to certain life logging tools, where designers or computer programs are challenged with the extraction of relevant contents, and their presentation back to the user (cf. Byrne & Jones, 2009; Lindley et al., 2009). Moreover, not only the creation of content but also their presentation serve as source for reflection (Sengers et al., 2005), but beyond, seemed to mirror the interpersonal relation of the couple as well (cf. relational level of communication: Watzlawik et al., 2003; Dindia, 1997; Wood, 2000) and allowed a definition of the same (Burleson et al., 2000; e.g. Nico and Ana saw themselves as a humorous couple). Furthermore, individuals might reflect on the degree to which they are satisfied with the partnership, and in how far it meets their needs. This can strengthen the relationship, but similarly highlight deficits, that either stimulate an adjustment for the better (corrective action, cf. Clippingdale et al., 2009), or, in some cases, could even lead to a dissolution of it. The results of the study for instance revealed that some of the messages - despite positive intentions - were not liked by the partner. However, most couples tried to solve these disappointments through external variable attributions (cf. Kelley, 1967; e.g. job and time requirements of the partner) or by focusing on the positive aspects of the video and the part-
ners’ behavior (e.g. the idea behind the message). This indicates further, that these couples were satisfied with their relationship. Couples in satisfied partnerships tend to strengthen positive experiences through the relationship by inputting internal partnership-related and stable attributions as well as altruism to the partner, while downplaying negative experiences through external variable factors (Kalicki, 2003). Further, they underplay selfish behavior of the beloved person and avoid it to assign blame. According to that, especially concerning romantic relationships, the self-perception of satisfied couples is likely to be idealized, and thus biased in positive directions (Mackie & Smith, 2007). In contrast, couples who are dissatisfied with their partnership tend to exaggerate negative partner behavior in implying selfish or hostile intentions that are ascribed to stable internal factors of the partner. In this case, the partner is blamed for his negative behavior, while positive acts and experiences are tended to be overseen (Kalicki, 2003). This might have appeared with the couple that broke up. The female complained about her partner’s video message and behavior in general, and attributed internal stable factors by describing him as a lazy, moody and selfish person. The content of the videos might have displayed the existing relational differences of the couple. Thus, the exchange through the Lovers’ box could be seen as a personalized opportunity for self-reflection, -expression, -examination and introspection of meaningful relationships through the use of technology (Brown, 2009). Of course, further and more detailed work in this regard is needed.

Beyond, participants reported that they talked about the messages (meta-communication, cf. Watzlawik et al., 2003) to explain little parts and to further clarify their underlying intentions. Since disappointments about the videos were rather seldom and primarily solved through cognitive reconstructions (Hinde, 1979; Kelley, 1967), no particular effect of meta-communication on couples’ relationship and their satisfaction with it could be examined. Interesting is however, that the exchange and the communication about the videos enriched interpersonal communication within the dyad about other aspects of their partners’ life (e.g. previous music career, job requirements, future plans about traveling). Thus, communication between partners was applied less for the dissolution of conflicts, but instead led to an increased mutual knowledge by giving each other an insight in one’s life, personality and perspective on the relationship as well as providing feedback about personal preferences and interests. According to Galloway (2003), knowing each other better, becoming more familiar with each other, or presenting oneself to the other means to be intimate. That the communication through the messages was intimate as well, appeared also through the creation and application of personal codes or idioms and individual meaning systems, solely shared and understood by the couples (e.g. ‘Friday Club’; cf. Clark, 1996; Hopper, Knapp & Scott, 1981; Wood, 2000). Burleson et al. (2000) emphasize that personal idioms, as they can not be understood by outsiders,
can be used as secret code for communicating in a highly expressive and intimate way while the presence of others (e.g. the investigator and media artist within the Lovers’ project), and thus can be seen not only as a sign of intimacy, and more mutual knowledge, but also as a good and plausible trade-off between couples’ relational privacy and the study requirements. In addition, the Lovers’ project was also valued as an additional shared activity of the couples, almost like a hobby that both connected. Both partners invested in their relationship through the creation of video-messages. The evaluation of the diaries and the concluding interviews revealed that overall, the Lovers’ messages were liked equally and equally rewarding within the couples, even though the females put significantly more effort in the video-creation than did the men. However, in regarding the results, one has to question if the contributions to the message-creation can really be seen as costs, and if the liking of received videos is the only reward of the exchange? This question raised as some statements of the participants indicated that not only the receipt of a meaningful message of the partner is rewarding and relevant, but also the giving of the self-made message to the partner (cf. Phil, who even repaired the broken box on his own, as his girlfriend wanted him to see her video). Participants wanted the partner to watch the message they made particularly for her/him, as they put effort in it, and hoped that it would be appreciated, liked and enjoyed. The appreciation of received messages demonstrates it’s acceptance through the partner and the therewith combined definition of the relationship (Dindia, 1997; Watzlawik et al., 2003). Or, according to Thibaut and Kelley (1959): “(...) expressing agreement with another person’s opinions or supporting his values often constitutes a reward for him, but value support may also reduce the costs he incurs in the relationship by reducing his concern for expressing unacceptable opinions” (p.50). Thus, showing that one likes the message does not only provide social support for the giving partner, but also avoids relational conflict, thus minimizes potential costs and serves as a stabilizing factor in the partnership. Walester et al. (1978) describe further that “intimate relationships are characterized at least as much by the joy of giving as by the desire to receive” (p.143; cf. also Rubin, 1970). Equally, Michaelis et al. (1984) state that with regard to intimate relationships, “the contribution one makes to the relationship may benefit the partner, the contributor, and the relationship” (p.355). The liking of the self-created message through the receiver could therefore be seen as a reward of the exchange for both partners. This could also be consulted to explain why inequities in contributions to the message creation between women and men were less relevant concerning the overall perceived outcome-balance of participants. However, it has to be kept in mind, that only two couples stayed in the project for it’s full length of five weeks (extremely small sample size: women = 2; men = 2). Thus, weekly fluctuations in each participants’ investment ratings had a high impact on the results (see further Section 5.1 on methodological limi-
tations). Even though the contributions between partners should be equal with regard to the resource (resource here: Lovers’ messages), an occurring inequity could also be solved through other contributions of the partner within their relational life, since resources within these kind of relationships are inter- or ex-changeable as well (Walester et al., 1978). However, this was not assessed in the scope of the present work, but should be considered in the future. What is missing as well, is a systematic analysis of individuals’ underlying reasons for the investments in the messages and the exchange in general. Whereas some might have anticipated the reciprocation of a nice video of the partner in return to the own one, others might have had a more altruistic motivation (Fehr & Gächter, 2000; Hinde, 1979; Clark & Mills, 1993; Hatfield et al., 1979).

Another critical aspect concerning the measurement of investments and equity in the scope of the present work is the assessment of the reward and cost level of participants. The effort, even though highly correlated with the time participants spent thinking of and creating the content is assessed only through one singular item, which has been interpreted by participants differently. Whereas some rated effort according to the time the spent collecting additional media material for the creation sessions (technical effort), other saw effort as the result of the time they spent thinking about the content (ideas/creative effort) and it’s presentation, or the degree of engagement to create something (personal/physical effort; e.g. stop-motion video of participant herself, or self written and recorded song). Here, future work should more clearly distinguish different levels on which individuals can contributed. These could then for instance be rated separately and accumulated to an overall score which might allow more comparable results. The same is true for the liking of messages which was regarded as the rewards of the exchange. As already discussed above, not only the receiving but also the giving of messages was liked. Beyond, even though a particular video was not liked very much and thus low rated, it does not mean, that the message was not appreciated, as participants then acknowledge the idea and the effort that was nevertheless put into it through beneficial attribution processes. Thus, the simple liking of received messages, as it is only one item that is assessed, might not sufficiently cover or clarify the rewards of the exchange.

Next, participants’ perception of the Lovers’ objects and their relationship to them will be discussed. Even though participants did know that the Lovers’ artifacts incorporated technology, they did not perceive them as digital objects. The aesthetic of the Lovers’ objects are a mix of the antique wooden box, that has to be unlocked with a physical key, and the digital screen whose content is triggered through an atypical interaction. This unfamiliarity opens a new space for individuals to explore and reflect on, and enables multiple interpretations of what technological artifacts can be or mean for them. Since participants perceived the boxes merely as a kind of old fashion jewelry box, the design of the Lovers’ objects inhibited their perception as
conventional digital devices. My assumption is that it is the *unrestrictedness of the design* that allowed the assignment of individual roles to the Lovers’ artifacts, and that this lies at the foundation of an attachment of personal significance to the same.

Furthermore, and over the course of the project, participants defined their Lovers’ box and gave it a place within their lives. The personal character and role of the box became obvious through statements of participants describing it as a keepsake whose function is to keep something important *safe and precious*, as a *personal* item that you would *carefully hide* under your bed (e.g. Julia and Phil). In this regard the lock-mechanism of the box was appreciated as well, as it allowed participants to shut away their intimate content to keep it *private* between oneself and the partner (e.g. Ana). Moreover, some participants integrated the box in a routine, and assigned individual roles to it. They accepted the Lovers’ artifacts within their relationship, and as such increased their *presence* in terms of meaning to these specific and unique digital objects (cf. Hallnäs & Reštröm, 2001; 2002; Csikszentmihalyi, 1995). This might be reached through the involvement of subjects in creating their own content, but beyond, also by enabling the *integration of the Lovers’ artifacts in couples’ lives* (cf. Zimmerman, 2009).

In addition, the present study also supports the main phases of the conceptual model of temporality of experience that Karapanos et al. (2009) suggested. The interaction with the Lovers’ object is initialized through the anticipation of a certain functionality (here re-/defined by participants themselves through the openness of the design space), and starts with an orientation phase where people get used to its basic functional features (plug-in of the box; video triggering through the key). As the Lovers’ results reveal, an increasing *familiarity* with the Lovers’ box led to an *incorporation* of the box in participants lives, but led also to an increased experience of *functional dependence* since individuals identified themselves and their relationship with it. Thus, as the product is incorporated in users’ lives, it “becomes a personal object, participating in private and social contexts, resulting in an increasing *emotional attachment* to the product” (Karapanos et al., 2009, p.735, own emphasis). The Lovers’ results differ only with regard to the perceived pragmatic qualities and stimulation from the proposed model, as it was discussed above.

Although for some participants the significance of the objects was not on par with the meaning of the messages themselves, and the new shared activity; others built a relationship with the digital artifacts, and reported that they will *miss* the interaction with them. Thus, and according to Newell and Gregor (2000): “One of the major measurements of success of a research project, unfortunately, may be the level of disappointment individual users show when the project ends, and the equipment has to be taken away from the users” (p.41).
5.1 Methodological Limitations

The present work can be seen as an attempt to study romantic couples and their interaction with technological artifacts through the integration of quantitative methods with qualitative ones. This was in particular motivated through the existing lack of systematic and longitudinal studies in the field of UX (cf. Karapanos et al., 2008), since the exploration of highly subjective individual experiences with and through technology is difficult, especially when it comes to interpersonal comparisons. However, the quantitative results gained through the checklists and in part through the diaries over the five weeks of interaction do not provide much additional information (cf. results of Kaye, 2004) to the results of the concluding interviews or the creation-session appointments. One key limitation in this regard comes from the small and rather narrow sample (age, education) that took part in the Lovers’ project. Thus, we have to be careful with the transferability of results, especially with regard to the UX results and those presented about couple’s investments in the exchange. However, the explorative character of the study enabled an authentic inclusion of the digital objects into participants’ daily lives, while keeping environmental influences and relational idiosyncratic with regard to the couples largely unconsidered. Especially romantic relationships differ highly in the extent to which intimacy develops, and as interpersonal closeness grows, so does the uniqueness of the dyad (cf. Levinger, 1980). Moreover, the personality of each individual influences how emotions are experienced. Whereas extroverted persons more likely focus on positive emotions through the interaction (e.g. excitement, warmth, happiness), introverted individuals focus more likely on the negative feelings (e.g. embarrassment or anxiety), as they fear for instance to be rejected by the partner (Guerrero & Andersen, 2000). Thus, when regarding the present results, not only inter-individual differences of participants have to be kept in mind, but also that the individual relationships are very different (Kaye, 2004), which makes the task of generalization more complicated. Even though validity and generalization in terms of common scientific goals are constricted, I believe that the individual experiences of the small Lovers’ sample provide a rich lens onto reflection on meaningful personal relationships and digital design.

Regarding the measurement of UX with the digital artifacts as well as of investments in the content-creation, it has to be noted that not all items for the assessment of the different product qualities of Hassenzahl et al. (2001) were appropriate to evaluate the Lovers’ artifacts. Especially the items cumbersome - direct (pragmatic quality), unwieldy - manageable (pragmatic quality), and easy - challenging (stimulation) were difficult for participants to relate to their objects. This is a general problem when it comes to the application of semantic differentials, as the created word pair not only has to present semantic opposites, but must be understood through the individual as well.
The additional product qualities (beauty, personal reference, emotionality, significance) were assessed through only one singular item, and considering the small amount of participants over the five weeks, does not allow any valid conclusion. Even though the application of the AttrakDiff enabled us to compare how individuals evaluate their Lovers’ object according to the three UX dimensions quantitatively, it has been especially the results of the interviews and the chats during and after the creation sessions who revealed valuable information about the underlying reasons, why the box was perceived as stimulating, how it become meaningful to the individual and if the interaction was usable.

However, in future studies, the questions in the diaries, chats and concluding interviews should be even more implicit and open-ended (cf. Kaye, 2004) than this was the case in the present work, to avoid leading participants in any direction and to truly understand how technological artifacts are perceived and understood by their users. However, people find it difficult to articulate their personal feelings, problems, and thoughts about the objects, the interaction with them and their relationship (cf. Jordan, 1998; Banse, 2003; Norman, 2004). Here again, interpersonal differences matter (e.g. shyness). Thus, there has to be found a trade-off in supporting participants to verbalize their experience without predetermining the answer.

In studying intimate relationships, another methodological caution has to be noted concerning the information that are gathered during the creation sessions and the concluding interviews as they are inevitably affected by the closeness of media artist and investigator to participants (cf. Levinger, 1980). The inclusion of a media artist had several reasons: The meetings with her were meant to be an aid for participants to (1) develop content in video format; (2) increase the aesthetic value of the message by using her skills to turn it into something special; and (3), keep a time schedule allowing regular reciprocal exchanges. Moreover, the weekly meetings gave me as investigator the opportunity to have a chat with participants about their intentions for and perceptions of the project. Even though participants acknowledge the supportive work of the media artist (video editing, material recommendations, etc.), some uttered that the integration of a third person was a disturbing factor concerning the degree of intimacy of the video content (cf. Höök et al., 2008; McCarthy et al., 2006). The willingness to present highly personal meaningful content to the partner within the Lovers’ project was also determined by individual differences of participants (e.g. extroversion). In future designs, one might have to consider alternative ways to enable the creation and transfer of video messages to avoid this kind of ‘privacy’ problems through the development of a software environment where the participants can easily and intuitively produce an expressive piece of media without the presence of the media artist and transfer it to the box, for instance, via BlueTooth.

Moreover, the exchange of the Lovers’ box is a very time consuming proce-
dure: videos have to be created and couples need to see each other regularly. The high requirements of the study have been one aspect that was sometimes criticized by participants, and which twice were the reason for couples to end the project ahead of time. This might also explain why none of the couples started to customized their personal and shared Lovers’ key, and rather concentrated on the video creation. Future studies that aim to analyze romantic relationships should consider to include couples that already live together to facilitate the handover of the box, and to extend the time periods between the creation sessions to allow participants more flexibility in this regard, and more time in general to prepare ideas and materials for the content. With regard to the recruitment of couples, future studies should also pay more attention to the motivation of both partners in taking part in projects like this. Whereas in some couples, both partners were equally motivated to invest in the Lovers’ project (Ana and Nico; Julia and Phil), in others there was one partner who slightly contributed more (e.g. Joey, Sarah and Lucy). For one couple, where this inequity in motivation occurred, this was the reason (aside of job requirements) to end the project ahead of time.

5.2 Future Prospects

Future work involving the Lovers’ objects should also focus more on the actual reflective processes of individuals, and how these can be assessed through a study design. How can reflective processes or a mere awareness of the relationship be evaluated? This was a shortcoming in the present work, as we aimed not to invent too much in subjects’ individual reflections and experiences concerning content and artifacts. Furthermore, it would be interesting to see how the interaction with and experiences through the Lovers’ objects differ from other means of communication (e.g. mobile phones, email) between partners. How far is the perception of their personal box different to these more common devices? This should be considered for assessment in future studies. Moreover, to find out, if the emotional attachment that some of the participants developed to the Lovers’ artifacts is sustainable, follow up interviews should be conducted. How might have the perception and evaluation of the box changed? Do participants still miss the objects?

During the project, participants articulated the wish to have access to all created messages at any time. Within the Lovers’ study, the box was set up to play only the latest video. Accessibility to all messages could further facilitate the building of a history around the Lovers’ box. Such an amplification of the history between subject and object could serve as additional source for reflection and might strengthens individuals’ attachment to the same (cf. Pierce, 2009; Hellnäs & Redström, 2001; Lindley et al., 2009). Thus, future work should consider how to contain, or achieve the created messages, to allow the Lovers’ objects to be an even more effective vehicle for significant
personal emotional experiences.
As a matter of course, the application of the Lovers’ artifacts, as explorable and self-related technological objects, is not restricted to romantic couples or couples in new relationships. They can be applied to all kind of important relationships (e.g. family relations, friends, relation to religion) that people want to reflect on, or share and present meaningful content with.

5.3 Conclusion

This work presents an empirical study of the explorable and self-related digital Lovers’ objects, which are designed to engage romantic couples in reflections on their relationship. To involve couples in reflective processes, the fundamental human needs for intimacy and belongingness are introduced and suggested as an extension to current user-centered design approaches in the field of HCI. The preparation and presentation of personal meaningful content for the beloved partner, does not only stimulate reflection, and communication within the dyad, but beyond also increases their mutual knowledge and supports their emotional intimacy. Furthermore, it empowers users to be co-creators for their own experiences. The giving and receiving of the Lovers’ box is described by participants as a very positive, warm and intimate experience that is highly appreciated, exciting, and stimulating, even over time. In addition, the exchange allows the exploration of social interaction and communication patterns within romantic relationships or other meaningful relationships through technology.

The Lovers’ project further stands as an example of how to create digital artifacts that have the potential to become meaningful in people’s lives, as the box became a vehicle for emotions and individually meaningful experiences. That individuals become emotionally attached to the artifact could be ascribed to the involvement of significant relationships, and individuals self-created relevant content, but also to the integration of the Lovers’ box in their relational everyday lives, and the regular and reciprocal exchange, which allows the development of a routine as well. This demonstrates that digital objects provide the potential to support our emotional lives. It also underlines the need to open up current design perspectives to allow people to embed their own experiences within technological artifacts through reflective processes on the object’s meaning and role. By emphasizing the aesthetics of the Lovers’ objects it is tried to escape conventional assumptions about how technology has to be used to enable rich, new experiences through the interaction with them. In summation, artifacts with incorporated technology, if cast appropriately, can address and support essential human needs and individual’s well-being, and thus, can become new sites of sustained personal emotional significance.
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## Appendix A - Additional Tables

Table 7: Technological difficulties and errors that occurred over all couples during the curse of the project.

<table>
<thead>
<tr>
<th>Couple Number</th>
<th>Errors occurred (frequency)</th>
<th>Way it was solved</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(None)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Sound didn’t work properly (1)</td>
<td>Fixing of loose speaker</td>
</tr>
<tr>
<td></td>
<td>Video didn’t play (1)</td>
<td>Unknown, prob. missed schedule</td>
</tr>
<tr>
<td>3</td>
<td>Box didn’t turn on at all (1)</td>
<td>Fixed by participant</td>
</tr>
<tr>
<td>4</td>
<td>(None)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Sound was on but the video didn’t play (1)</td>
<td>Worked after it was plugged in again</td>
</tr>
<tr>
<td></td>
<td>Start-up sound didn’t play, loading of video took very long (1)</td>
<td>Message was finally seen by participants</td>
</tr>
</tbody>
</table>
Table 8: Mean values and standard derivation of the last three couples according to the scales: RAS, commitment, passion, general intimacy, emotional and intellectual intimacy.

<table>
<thead>
<tr>
<th>Couple No.</th>
<th>RAS</th>
<th>Passion</th>
<th>Commitment</th>
<th>Intimacy</th>
<th>Emotional Intimacy</th>
<th>Intellectual Intimacy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td></td>
<td>after</td>
<td>8.571</td>
<td>.201</td>
<td>6.680</td>
<td>.255</td>
<td>8.313</td>
</tr>
<tr>
<td>5</td>
<td>before</td>
<td>8.710</td>
<td>.000</td>
<td>7.755</td>
<td>.177</td>
<td>9.065</td>
</tr>
</tbody>
</table>
Appendix B - DVD

Overview about the file structure:
concluding meeting
  interview full
  interview half
  concluding questionnaire
  receipt

literature

submissions CHI and IJHCS
  Loversproject_CHI2010.pdf
  Loversproject_IJHCS_SpecialIssue.pdf
  Loversproject_Videosubmission_CHI2010.mov
  masterthesis.pdf
Statement of Authenticity

I hereby declare that I have developed and written the enclosed master thesis entitled:

"The Lovers’ Project: Designing for personal emotional significance of objects with incorporated technology - A case study"

entirely on my own and have not used outside sources without declaration in the text. Any concepts or quotations applicable to these sources are clearly attributed to them. This master thesis has not been submitted in the same or substantially similar version, not even in part, to any other authority for grading and has not been published elsewhere.

Duisburg, 1st March 2010

______________________________  ________________________________
(Place, Date)                  (Signature, Anja Thieme)