

**Adopting communication technology  
in later life:**

The decisive role of benefits

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**Adopting communication technology  
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The decisive role of benefits**

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# 1

## Introduction

Aging is often associated with a growing tension between aspirations and the possibilities of realizing them. Are aspirations naturally at odds with aging? A common conception of the potential conflict is that the decline of physical and mental capabilities might restrain older individuals from doing what they actually want to do (Bengtson & Schaie, 1999). Less common is the idea that older individuals might not always want what they could possibly get. The adoption of new technology in later life involves both fields of tension.

Adopting new technology usually requires investment. This could be financial, but could also be an investment in terms of time, effort, and frustration encountered until the use of the new technology is integrated into one's life. Considering age-related mental change and decline (e.g., Craik & Salthouse, 2000), older adults in particular may perceive the learning of new skills to handle technological equipment as a serious investment. Generation-specific technology experience might raise additional obstacles, for example when users stick to familiar skills and strategies that are inapplicable to a new technology (Docampo Rama, 2001). Due to their perception of 'investment', the elderly might not be motivated to learn new skills, even if they could, as they do not perceive the expected result as desirable and helpful in fulfilling their actual aspiration, which usually goes beyond using a new technology.

This thesis focuses on older individuals' adoption of *communication technology*, such as the Internet. Communication technology may have the potential to enrich and facilitate the lives of people of all ages and to fulfill communicative aspirations. However, this potential may be experienced in different ways by older and younger individuals, who have different experiential and perceptual worlds (IGT, 1997). In addition, specific social and communicative

aspirations and priorities developing in the course of life (see Carstensen, 1991) may determine the meaning of 'enriching and facilitating potentials' of communication technology.

### **1.1 Adopting technology: a cost-benefit analysis**

The assumption at the heart of this thesis is that the adoption of technology by both old and young individuals involves the weighing of the 'cost', for example the investment of effort, against the 'benefit', for example the fulfillment of communicative aspirations. The subjective outcome of this cost-benefit analysis determines or affects the adoption of new technology.

As a consequence of age-related mental and physical change, the weighing up of costs and benefits may change when people get older. For example, an older individual may perceive the same absolute cost of skill acquisition to handle a computer as larger than a younger individual would. This cost should probably be counterbalanced by a relatively large benefit, so that computer use is perceived as being worthwhile, and, ultimately, attractive. However, what does a 'large benefit' mean from an older adult's perspective? The answer is not necessarily found in the *amount* of benefit needed to counterbalance the cost, but will more likely be in the *kind* of benefit capable of tipping the balance in favor of computer use.

This idea of a cost-benefit analysis is compatible with life-span developmental theories, in particular the Baltes and Baltes model of selective optimization with compensation (Baltes & Baltes, 1990). One of its assumptions is that, with age, people increasingly tend to focus their limited energy on activities and domains that they perceive as being most essential and valuable in their lives. Optimizing their performance in these domains is a way of maintaining well-being in spite of limitations. Using the terms of the Baltes and Baltes model, older adults apply the principle of 'selective optimization'.

The adoption of new technology by older individuals may also be subject to selective optimization and the inherent weighing of costs against benefits. To be 'selected', the use of new technology should be perceived as sufficiently valuable, or beneficial, compared to the investment of effort required.

### **1.2 Attention for the role of benefits**

Older individuals tend to be approached in terms of inability and restrictions regarding the use of new technology. Simply stated, the emphasis in research in

the fields of psychology, as well as human factors and ergonomics, has traditionally been on the cost side of the cost-benefit balance (see chapter 3 for an overview).

Gerontechnology, defined as the study of technology and aging for the improvement of the daily functioning of the elderly (Bouma, 1992), explicitly recognizes the importance of older individuals' aspirations, besides their abilities and inabilities (Graafmans & Taipale, 1998; Lawton, 1998). However, basic gerontechnological research to date has primarily addressed the understanding and leveling of potential barriers for older individuals to use technology, for example in handling complex user interfaces (Docampo Rama, 2001) or learning to use interactive devices (T.D. Freudenthal, 1998). As yet, the perception of the benefits of technology by older individuals has received relatively little attention.

### **1.3 Objectives and outline of this research**

The objective of this research is to gain an insight into older adults' motivations for adopting or rejecting new technology. While not denying that costs may play a substantial role in these motivations, and that we still face the challenge of making the ergonomic side of the cost-benefit balance lighter, the studies in this thesis aim to shed light on the *benefit* side of the balance. We assume that the perceived benefit is the other important factor, in addition to the perceived costs, when adopting new technology.

With respect to the adoption of communication technology, which is the focus of this thesis, social priorities and preferences are important: *with whom* do older individuals want to communicate? Related aspects are the form, the context, and the purpose of the communication: *how* do older individuals want to communicate *in a particular situation considering a particular communication goal*? An additional aspect is how older adults see these aspirations in a *future time perspective*: would their aspirations be different when they consider them in the longer term?

*Chapter 2* addresses social selectivity. The purpose of this study is to gain an insight into the extent to which social selectivity is voluntary for older individuals, with a view to the desirability of interventions. The Baltes and Baltes principle of selective optimization (Baltes & Baltes, 1990) was applied to the social domain, in accordance with Carstensen's socio-emotional selectivity theory (Carstensen, 1991). The study in chapter 2 investigates social preference

as a function of the emotional closeness and the geographical distance of social relationships in two groups of older individuals of different ages, in a short-term and a long-term perspective.

*Chapter 3* addresses the selective use of media. This study investigates the preferences for traditional versus electronic communication methods of three groups of older adults with different amounts of Internet experience, while pursuing different communication goals. The study aims to shed light on older adults' motivations for a selective media use.

*Chapter 4* examines the role of costs and benefits in media evaluations. The study in this chapter elaborates and combines the major insights from the studies in chapter 2 and chapter 3, and aims to determine the relevance of the benefit concept for evaluating new versus traditional communication methods in different contexts. For this purpose, older American and Dutch e-mail users and non-e-mail users evaluated different media in different communication contexts. An additional goal here was to examine the generality of the benefit concept over cultures and user experience.

*Chapter 5* examines the 'temporal discounting' of benefits. The phenomenon of temporal discounting implies the devaluation of rewards whose obtainment is postponed. The study in chapter 5 aims to gain an insight into the perception of benefits in a future time perspective, considering one's age and one's personal circumstances. Theoretical insight into this phenomenon in relation to age may help us to understand the willingness of older individuals to invest in new technology.

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# 2

## **Social preference in late adulthood: Balancing emotional closeness and geographical distance**

### **2.1 Introduction**

Social networks gradually become smaller with age. The decrease generally starts in early adulthood and continues into later life. We could characterize it as quantitative, in that it concerns the social network *size* in particular (Carstensen, 1992; van Tilburg, 1998). Caregivers, policymakers, and social scientists often view this age-related development as worrisome and undesirable as soon as it concerns older individuals.

Researchers have proposed letting older adults take advantage of new communication opportunities offered by computer-supported media, such as e-mail, to enhance their communicative abilities (Bikson & Bikson, 2001; Lawhon, Ennis, & Lawhon, 1996; Wright, 2000). Distance from relatives and friends might be bridged more easily, and they might even extend their social network by making new friends via the Internet (see, e.g., Trocchia & Janda, 2000).

However, gerontologists have not reached a consensus about the nature and underlying mechanisms of age-related network reduction, nor about the desirability and effectiveness of interventions to promote social interaction among older adults (Fung, Carstensen, & Lang, 2001; Stevens & van Tilburg, 2000). Obviously, the causes and nature of age-related network change have implications for the desirability, the need, and the form of technological interventions to support social communication.

This study is aimed at further investigating age-related social preferences. A basic question is whether network shrinkage is due to age-related constraints

and barriers, or is a result of a voluntary limitation of social activity by the older individuals themselves. Classical examples of contrasting views are Havighurst and Albrecht's activity theory (Havighurst & Albrecht, 1953; also see Maddox, 1965), as opposed to Cumming and Henry's disengagement theory (Cumming & Henry, 1961). According to the activity theory, extrinsic social and physical forces cause the involuntary withdrawal of older adults, whereas the disengagement theory claims that the older individual naturally and voluntarily disengages from society, in anticipation of death.

Contemporary gerontologists do not generally adhere to either of these extreme viewpoints and their foundations. They see adequate adaptation to mental and physical limitations as the main ingredient of 'successful aging' in various domains of everyday life, ranging from maintenance tasks and physical exercise to leisure activities and social relationships. The contemporary gerontological literature describes a variety of 'adequate adaptations'.

Continuity theory (Atchley 1989) states that the continuation of existing psychological and social patterns and goals with the help of familiar knowledge and skills is the best basis for a successful adaptation later in life. Brandtstädter and Renner (1990) also recognize that older adults strive for continuity. In addition to finding ways of actively directing and continuing one's personal development (assimilation), goal adjustment (accommodation) is also important in the process of coping with age-related decline (see Brandtstädter & Greve, 1994). Heckhausen and Schulz (1996, 1995) propose concepts similar to those of Brandtstädter and Renner, defined in terms of control. Primary control describes behavior aimed at affecting and adjusting the external world in order to continue reaching one's goals. It has functional primacy over secondary control, which refers to the adjustment of the internal world (e.g., cognitions and emotions). Finally, according to the Baltes and Baltes theory of selective optimization with compensation (Baltes & Baltes, 1990), the selective use of physical and mental resources promotes sustained well-being in old age. Older adults prefer to focus their dwindling energy on what they perceive to be valuable and significant activities and goals, thus preserving the quality of their lives (M. Baltes & Lang, 1997; P. Baltes, 1987).

With the exception of activity theory, the above-mentioned theories recognize the paradoxical preservation of well-being experienced by many older adults despite age-related physical, mental, and social loss. Translated to the social domain, this paradox implies that many older adults are still satisfied with

their social networks and retain social and emotional well-being to a great extent, in spite of decreased interaction and relatively small social network sizes (Fredrickson & Carstensen, 1990). This might be the result of the adjustment of social aspirations to the state of the network, in accordance with goal-adjusting mechanisms such as 'accommodation' and 'secondary control'. In this case, the underlying explanation of decreasing social contact and network shrinkage is couched in terms of involuntariness and having to cope with losses. Another possible explanation is that older adults proactively reshape their social networks, for example by selection, in order to fulfill changing social needs and aspirations. This explanation assumes that network change is not necessarily due to loss, but a voluntary process directed by social priorities and preferences that develop and change during the life span.

Socio-emotional selectivity theory (Carstensen, 1991) contends that carefully spending precious effort, energy and time does not conflict with network quality and psychological well-being, provided that the selection of contacts fulfills one's social needs. Empirical support for Carstensen's theory (Carstensen, 1992; Lang & Carstensen, 1994) is consistent with the above-mentioned psychological model of selective optimization with compensation (Baltes & Baltes, 1990).

It is plausible that social aspirations and needs of older individuals are influenced by reacting upon undesired yet unavoidable age-related change, on the one hand, and proactively managing (later) life, on the other hand. Supportive interventions to enhance older adults' communications operate in this field of tension, and may be most successful when they support appreciated relationships and level barriers as perceived by older adults.

Carstensen's socio-emotional selectivity theory was chosen as the framework for the investigations in this study because it explicitly addresses both *proactive* and *reactive* age-related motivations affecting social network development and change. Moreover, the theory addresses the role of *time* in social preference. Time perception might also be important in the view of possible communications that anticipate one's future, both in terms of voluntary selection and necessary adaptation. In the next few paragraphs we will look briefly at the interrelationship between social selectivity, time perception and the social preferences of older adults.

The selection of social activities, or the 'motivated redistribution of resources' by older adults (see Baltes & Carstensen, 2001, p. 215), is not only motivated by parsimony, but is also determined by the functionality of a

relationship for a person's goal pursuit. Carstensen distinguishes two broad functions of social relationships during life, namely the information, or knowledge-providing function, and the emotion regulation, or affective function. The information function is primarily associated with long-term goals and postponed rewards, such as creating future opportunities for a professional career or learning about societal rules, whereas the affective function is primarily associated with short-term goals and immediate rewards, such as the experience of positive emotions and confirmation.

The salience and relevance of these goals change throughout life. The emphasis gradually shifts from (future directed) knowledge acquisition towards (present-oriented) experience of emotional satisfaction. This explains why older people choose *emotionally close* relationships, as these relationships are most likely to yield an immediate positive emotional experience. Moreover, superficial contacts are of no current use to the individual, and could even result in a negative experience (for instance, being approached in an 'ageist' manner). They are not worth the trouble and are preferably avoided, thus promoting a parsimonious use of resources and psychological well-being at the same time. (Carstensen, Isaacowitz, & Charles, 1999).

Carstensen states that social aspirations are inherently determined by the perceived position in the lifecycle, which could be interpreted in terms of age. However, studies in which time perspective was manipulated (Fredrickson & Carstensen, 1990; Fung, Carstensen, & Lutz, 1999), or in which *younger* participants had a limited perspective due to a life-threatening disease (Carstensen & Fredrickson, 1998), show that the above-mentioned present-oriented shift is not related to age per se, but to one's perception of future time as limited or as expansive.

Apart from age, one's experienced and expected *health* might particularly influence the perception of future time, both in terms of one's expected time to live and the expected quality of life. The latter could be affected by physical limitations. As indicators of time left to live, both age and health are determinants of one's social preference. In terms of Carstensen's theory, old age and poor health make people more present-oriented and determine a preference for emotionally close relationships.

However, in addition to a degree of emotional closeness, physical distance is also inherent in social relationships. This aspect of relationships has not been explicitly addressed in socio-emotional selectivity theory. As it takes effort to

bridge a distance, this might be a serious barrier for persons of advanced age, for example due to a decline in health and restricted mobility. A general tendency towards the parsimonious use of energy by older adults makes them increasingly sensitive to the distance of their contacts. A reduction of long-distance contacts might be an involuntary development that even affects highly appreciated relationships.

To summarize, the impact of age on social preference might be twofold. As an indicator of time left to live, aging makes people more *present-oriented*, which upgrades emotionally close relationships. As a plausible risk factor regarding physical health, it makes people both more present-oriented and more *local-oriented*, and centers their preference on short-distance relationships. The latter might not be primarily inspired by the intrinsic value of the contact, but by unavoidable adaptation. The present-orientedness and local-orientedness of older adults are very likely to increase over time.

Obviously, both phenomena are of interest for the possible enhancement of older adults' social communications. The question is *which* contacts, in terms of emotional closeness and geographical distance, may need support in the view of older individuals. In this respect, the perception of time is also relevant. Despite their present-oriented attitude, older adults may still determine their current decision making by anticipating the future, with regard to new communication opportunities for example.

This study investigates two features of social relationships that possibly determine older adults' preferences in the short-term and longer-term perspective, namely *emotional closeness* and *geographical distance*. It also looks at whether the appreciation of these characteristics is age-related, which is why older adults of different ages participated in the study. The impact of physical health status on social preference was also investigated. The implications of socio-emotional selectivity and the assumption of minimization in using mental and physical resources with age, possibly related to health decline, lead to the following hypotheses:

Older individuals generally prefer contact with persons *emotionally close* to them, to contact with persons not emotionally close. This preference is stronger in a long-term perspective than in a short-term perspective (main effect of time perspective).

Contact preference for emotionally close relationships is stronger in older-old individuals than in younger-old individuals (main effect of age), and is

stronger in not so healthy individuals than in healthy individuals (main effect of health).

Socio-emotional selectivity predicts that older and less healthy individuals have a higher preference for emotionally close relationships in the long term (compared with the short term) than do younger and healthy individuals (time perspective  $\times$  age interaction and time perspective  $\times$  health interaction).

The literature does not give clear directions regarding the impact of *geographical distance* on social preferences, although it seems plausible that there would be a general preference for short-distance relationships. This preference would most likely be stronger in a long-term perspective than in a short-term perspective due to the fear of a decline in health possibly affecting one's mobility (main effect of time perspective).

The fear of a decline in health might be felt more strongly by older-old than by younger-old individuals, thus predicting a stronger contact preference by the older-old individuals for short-distance relationships (main effect of age). However, health status might be a better predictor than age, because physical health is more directly related to one's mobility and physical energy than age (main effect of health).

Finally, the contact preference for relationships at a short physical distance might increase more strongly from a short-term to long-term perspective in older and less healthy individuals, respectively, than in younger-old and healthy individuals (time perspective  $\times$  age interaction and time perspective  $\times$  health interaction).

To test these hypotheses, thirty older participants were asked to evaluate a selection of their own social relationships in a short-term and long-term perspective, by means of a pair-wise comparison. In order to select relationships of current interest in the participants' everyday lives, relationships were listed in connection with a concrete visit or social activity in the near future. To examine the age effect, the study was performed with one group of participants aged between 65 and 70 years, and one group of participants aged 80 years and older. They were all living independently. This implied that their physical health was sufficient to allow voluntary decisions about which social contacts to maintain, i.e., distant contacts were not excluded due to physical limitations. In the introduction of the interview the participants were asked about their physical health.

## 2.2 Method

### 2.2.1 Participants

Thirty independently living older adults in the Eindhoven area of the Netherlands participated in this study. They were recruited from research volunteer pools. Fifteen participants, eight women and seven men, were in the age range from 65 to 70 years ( $M = 67.1$ ,  $SD = 1.3$ ). All male participants in this group had a partner; all female participants but one lived alone. Another fifteen participants, eight women and seven men, were aged 80 to 87 years ( $M = 82.4$ ,  $SD = 2.3$ ). All women lived alone and all men but one had a partner.

Table 2.1

*Numbers of participants according to age group, gender and marital status*

	male		female		total
	alone	partner	alone	partner	
65-70 years	0	7	7	1	15
80+	1	6	8	0	15

### 2.2.2 Procedure

At the beginning of the interview the participants were informed about the purpose of the study and the procedure to be followed. They filled out a form for demographics and indicated their physical health on a 10-centimeter straight unmarked line, a so-called Visual Analogue Scale (VAS; see Gift, 1989). Marking it on the left end meant a very negative subjective health evaluation; a mark more to the right meant a more positive evaluation. They also verbalized their state of health ('poor', 'fair', 'good', 'excellent').

#### *Item selection*

In this study the participants expressed preferences for social activities by means of pair-wise comparisons. Their own social activities served as the choice items forming the pairs. The choice items were selected from activities of current interest in the participants' lives. Concrete social activities planned in the coming six months were therefore listed. These could be visits or other activities in which the main goal was to maintain the social relationship. In the verbal instructions these activities were described as '*activities just to keep in touch, for example visiting your niece next month*' and '*activities that you always*

*do together with or for other people, in which the social contact is most important, like playing cards with friends, or, for example, volunteering in the bar of a senior home'. The specific persons involved in the participant's activity had to play a central role, and should not be easily replaceable by another person. For example, 'volunteering in the church this Saturday together with Peter and Tom, the two other regular volunteers', was included, whereas 'volunteering as a driver in the seniors' transportation service' was not. Furthermore, activities were not listed if they were solitary, such as reading a book, or if they were not concretely planned, for example 'hanging out with friends'. Phoning was also not included.*

To determine the characteristics of the social activities mentioned, each activity was systematically described according to a schedule: (1) What is the activity? (2) When is it planned for? (3) Which other person is, or persons are involved? (4) Do these persons live within a thirty to forty-five minute distance from the participant (transportation one-way) or farther away? (5) How long has the participant known the other person(s)? (6) How would the participant briefly characterize the type of relationship, formally as well as in terms of a value judgment? (For example 'we are sisters and have a very special relationship', 'good friends, we don't need to say a word to understand each other', 'he is my son, but we have nothing in common, and 'neighbor, just an acquaintance, she is nice'). The listing continued until the participant could not mention more planned social activities.

A maximum of ten of these activities were selected in agreement with the participant. The aim was to produce a differentiated set that qualitatively represented the participant's mentioned social activities, that is, consisted of both activities that were felt to be important and activities that were felt to be less important. The participant first picked his or her five most important or favorite social activities. This selection was supplemented with up to five of the remaining social activities that were felt to be substantially less important than the initial five.

To summarize the selection of the items: (I) An activity should be inherently social (e.g., visit) or exclusively connected to a social relationship or context. (II) There was a concrete plan for this activity within the coming six months. (III) Both activities considered to be 'favorite' or important, and activities considered to be less important were selected; approximately 50% were 'very important' or 'favorite' activities and 50% were 'less important' or 'less appreci-

ated' activities (compared to the 'favorites'). The resulting selection did not necessarily comprise of ten activities per person; there were usually fewer than ten activities that met all the requirements.

### ***Pair-wise comparison***

The selected activities were written along the x-axis and the y-axis of a large 10 × 10 matrix. In this way, 100 pairs of activities were defined. The diagonal comprised 10 pairs of identical activities, and was not used for the pair-wise comparison task. The 90 pairs remaining each occurred twice (below and above the diagonal). The participants were asked to make pair-wise comparisons of these activities in two different time perspectives. First, the maximum of 45 comparisons above the diagonal addressed the short-term perspective. Next, the same comparisons were made in a long-term perspective, represented below the diagonal. The assignment for the short-term condition was formulated as follows: *'Imagine that you had to decide about canceling one of these two planned activities, which of the plans would you most regret canceling?'* The assignment for the long-term condition was: *'Imagine that you had to give up one of these two activities permanently, which one would you most regret giving up?'* During the assignment the participants were reminded to consider the complete activity, for example, not 'playing cards' but 'playing cards with my neighbors this Monday'. In the long-term condition the point in time (e.g., 'this Monday') was not considered. The participants were encouraged to make a decision; 'both' was not an option. An arrow pointing at the preferred activity (the one that was hardest to cancel or to give up) marked the choice in the matrix. The participants were asked to motivate their choices verbally during the task. One session lasted between 2 and 2½ hours, with a 15-minute break and refreshments halfway. Participants received 25 Dutch guilders (about Euro 12) for their cooperation.

### **2.2.3 Analyses**

#### ***Labeling***

The pair-wise comparison assignment yielded preferences for social activities. The social relationships inherent in these activities were unequal in various ways. Two types of inequalities were of particular interest in this study, namely those with respect to the kind of relationship and those with respect to geographical distance. In order to associate the participants' *contact preferences*

with these *characteristics*, each activity was labeled in terms of both 'kind of relationship', further expressed as 'emotional closeness between the participant and the person(s) involved' and 'geographical distance between the participant and the person(s) involved'.

The classification in terms of 'emotional closeness' was dichotomous, that is, either 'close' or 'not close'. It was based on the participant's own characterization of the relationship (according to point 6 in the listing of relationships, see above), rather on its judged value than on the formal relationship per se. For example the characterization 'good friends, we don't need to say a word to understand each other', would be assigned as being 'close', whereas 'he is my son, but we have nothing in common', would be 'not close', despite the blood relationship. In doubtful cases the duration of the relationship was also taken into account: a relationship with a long history is likely to be 'close', whereas a relationship of just six months is more likely to be 'not close'. The assignment of relationships to the 'close' or the 'not close' category was intuitive to some extent, and was therefore also performed by a second rater (Inter rater Reliability 89%). Finally a third rater judged the remaining items. These items were assigned to the category mentioned by two of the three raters.

The distance classification of activities was based on traveling times indicated by the participants. Geographical distance was defined as either 'short-distance' (less than 45 minutes travelling) or 'long-distance' (45 minutes travelling and more). The participants indicated verbally that between half an hour and three quarters of an hour was still close enough 'to drop by for a cup of coffee', whereas one hour travelling and more was perceived as a substantial barrier for such short visits.

### ***Determining contact preference strengths***

The labeling procedure defined the participants' short-term and long-term contact preferences in terms of both 'emotional closeness' and 'geographical distance'. Next, degrees of contact preference associated with these respective characteristics were determined per individual for the short-term and the long-term condition separately. In the following paragraphs we elaborate on the procedure for 'emotional closeness', but this also applies to 'geographical distance'.

To investigate the association of contact preference with 'emotional closeness', the *ratio* of preferred relationships labeled as 'close' to preferred relationships labeled as 'not close' was calculated. The ratio was expressed as

*e-logit*, according to the formula  $\ln[(\text{number of contact preferences for 'close' relationships} + 1) / (\text{number of contact preferences for 'not close' relationships} + 1)]$ . One of the reasons for using *e-logits* for the analysis was to stabilize the variances for an ANOVA. The short-term and long-term perspective yielded one *e-logit* each per participant, expressing his or her degree of contact preference, or *contact preference strength*, for relationships labeled as 'emotionally close' in that time perspective.

For example, a participant could have selected seven relationships, yielding a maximum of 21 pair comparison outcomes in the short term perspective, and another 21 in the long term perspective: the matrix area minus the diagonal, divided by two. In the short-term perspective all pair-wise comparisons resulted in a preference for a social activity and the inherent social relationship. Fifteen of these preferred relationships were labeled as 'close' (consequently, the remaining six preferred relationships were 'not close'). The contact preference strength for emotionally close relationships for this participant in the short term is  $\ln[(15 + 1) / (6 + 1)] = 0.83$ . In the long-term perspective this participant yielded two missing values and 17 preferred relationships labeled as 'close', resulting in a contact preference strength of  $\ln[(17 + 1) / (2 + 1)] = 1.79$ . Values larger than 0 express contact preference for emotionally close relationships, values smaller than 0 express a preference for not emotionally close relationships, and 0 means 'undecided'.

In this experiment, on average yielding 14.5 outcomes per individual per time condition ( $SD = 6.7$ ), the preference strengths ranged theoretically from a minimum of -2.67 to a maximum of +2.67 ( $SD = 0.42$  for both values).

The calculations for 'geographical distance' were performed with the same pair-wise comparisons as the calculations for 'emotional closeness', but counting the 'distance' labels instead of the 'closeness' labels. In this case, values larger than 0 express contact preference for short-distance relationships.

Repeated Measures were used to compare ANOVAs short-term and long-term contact preference strengths for 'emotional closeness' and 'geographical distance' separately. These ANOVAs were conducted using the individual's contact preference strengths in *e-logits*.

For the analyses the total sample of 30 participants was split up according to the criteria age and subjective health, respectively. All counts and statistical analyses were carried out for the total sample and for both sample divisions.

## 2.3 Results

### 2.3.1 Participant characteristics

Both age groups comprised 15 participants. In order to study the influence of health on contact preferences, the sample was divided into a less healthy and a healthy group. This was done by dividing the participants into a group scoring below average on the VAS and a group scoring above average on the VAS. This resulted in 12 participants with an average VAS score of 5.4 ( $SD = 1.7$ ) and 18 participants with an average VAS score of 8.2 ( $SD = 0.8$ ). These scores were significantly different ( $t [28] = -4.831, p < .001$ ). The participants' verbal health reports were clustered, 'poor' and 'fair' health forming cluster 1 and 'good' and 'excellent' health forming cluster 2. These health clusters correlated positively with the VAS scores (see Table 2.2,  $r = .67, p < .001$ ). Age did not correlate with the other variables.

Table 2.2

#### *Correlation of participant characteristics*

	age	gender	health (verb.)	health (VAS)	marital status
age	--	.00	.13	.05	-.13
gender		--	.05	-.07	-.87**
health (verbal)			--	.67**	.08
health (VAS)				--	.29
marital status					--

\*\*  $p < .001$

### 2.3.2 Reports of social relationships

The selection procedure for social activities yielded a pre-selection of four to nine 'relevant' activities per participant, that is, activities where the main purpose was to maintain the social relationship ( $M = 6.1, SD = 1.2$ ). In the remainder of this report we will refer to these activities as 'relationships'. The total sample yielded 182 relevant relationships. These relationships were divided into four types according to the labels. Figure 2.1 shows the different types of social relationships mentioned by the participants, in terms of emotional closeness (the outlined areas represent 'close' relationships), geographical distance (white is

'short-distance', dark is 'long-distance'), and their subsequent combinations. The pre-selections of the total sample are represented in the upper pie chart. The lower pie charts show the reports of social relationships in the same sample, divided by the criteria age (65 to 70 years versus 80 to 87 years) and subjective health (healthy versus not so healthy).

**pre-selections of social relationships**

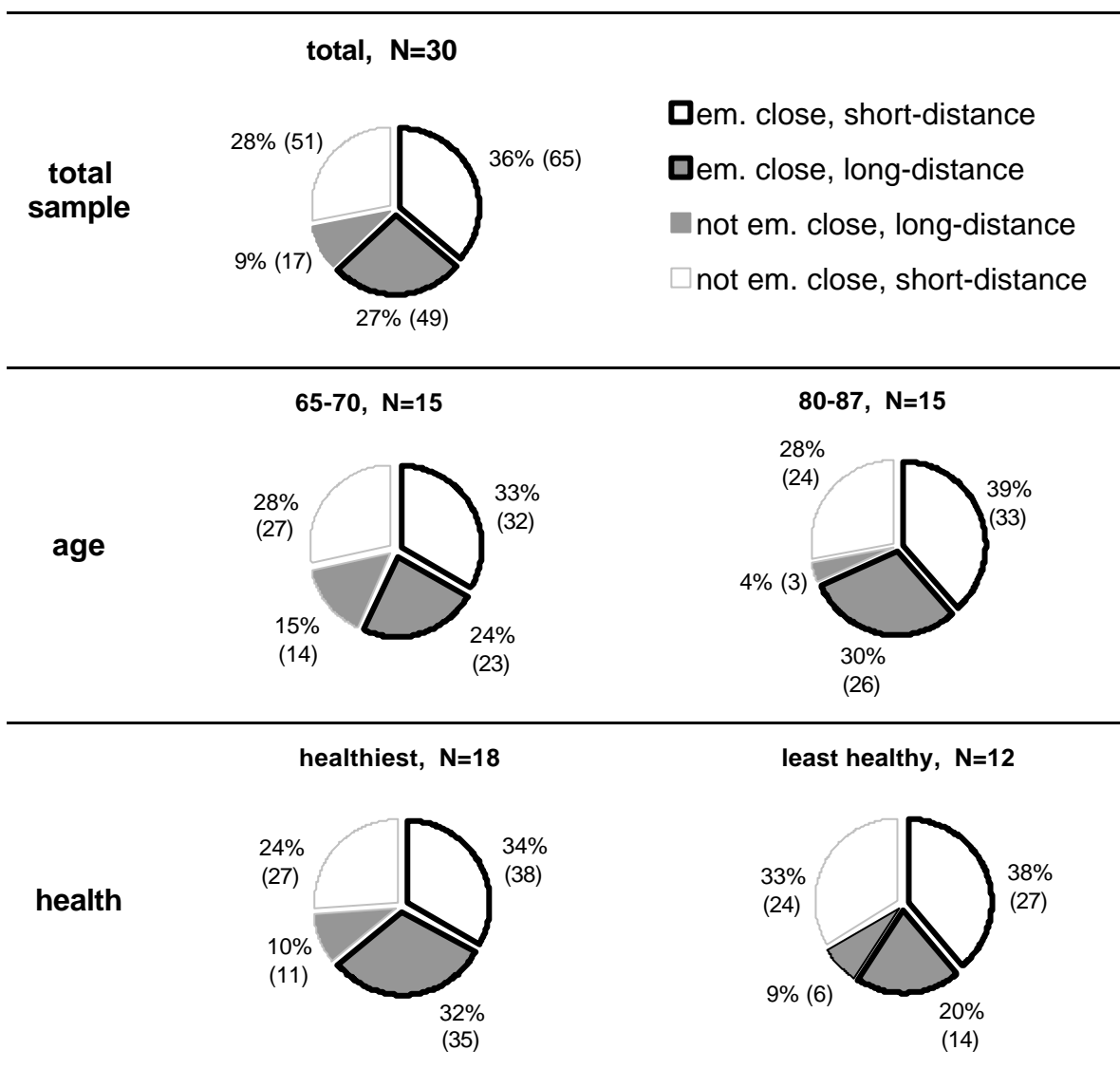


Figure 2.1: Reported types of relationships in the total sample and per subsample (according to age and subjective health) in terms of emotional closeness (outlined areas represent emotionally close relationships) and geographical distance (white areas short-distance, < 45 minutes; dark areas long-distance, ≥ 45 minutes). Absolute numbers of relationships are in brackets.

### ***Emotionally close relationships***

A binomial test performed on the absolute numbers showed that the social relationships mentioned in the total sample were more often emotionally close than not close (63% 'close',  $p < .001$ ). The same applied to relationships reported by the oldest seniors (69% 'close',  $p < .001$ ) and the healthiest seniors (66% 'close',  $p < .001$ ). Younger seniors and not so healthy seniors did not report significantly more emotionally close than not close relationships (57% and 58% 'close', *n.s.*).

### ***Short-distance relationships***

The pre-selections comprised significantly more relationships at a short physical distance than relationships far away. This applied to the total sample (64% short-distance,  $p < .001$ ) as well as to the sub-samples (61% to 71% short-distance,  $p$ -values  $< .03$  to  $< .001$ ), with the exception of the healthiest participants (58% short-distance, *n.s.*).

### ***Proportionate representation of relationships***

The pie charts in figure 2.1 indicate a relatively small representation of emotionally *not* close relationships at a long distance (the light, plain areas). Chi-square tests of homogeneity showed that the proportions of the four different types of relationships were indeed significantly different in the total sample ( $\chi^2 [1] = 5.96$ ,  $p < .02$ ) and among participants 80 years and older ( $\chi^2 [1] = 12.71$ ,  $p < .001$ ). In the other sub-samples the proportions were not significantly different.

### ***2.3.3 Contact preference in time perspective***

The participants in the total sample made 483 pair-wise comparisons of social relationships for the short-term and another 483 for the long-term. In the short-term perspective 38 of all comparisons did not yield an answer; in the long-term perspective 50 did not yield an answer. In these cases the participant was unable to make a decision. The calculations of the individuals' short-term and long-term contact preference strengths were based on the remaining pair-wise comparisons. On average, each participant made 16.1 comparisons per time condition, ranging from 6 to 36, of which approximately 14.5 comparisons per time condition were usable to determine the participant's contact preference strengths. See Table 2.3 for an overview.

Table 2.3

*Numbers of pair-wise comparisons made in short-term and long-term perspective*

	short-term condition			long-term condition		
	sample (N=30)	mean	SD	sample (N=30)	mean	SD
total	483	16.1	7.0	483	16.1	7.0
missing	38	1.3	2.1	50	1.7	2.3
usable	445	14.8	6.7	433	14.4	6.7

### ***Contact preference for emotionally close relationships***

Figure 2.2 (presented on the next page) shows average contact preference strengths for emotionally close relationships in a short-term and long-term perspective. These contact preference strengths are expressed in *e-logits*, values  $> 0$  meaning contact preference for emotionally close relationships and values  $< 0$  meaning contact preference for not emotionally close relationships. The upper chart with the single line represents average contact preference strengths of the total sample ( $N = 30$ ). The other charts show average contact preference strengths according to the differentiating criteria age and subjective health. Each line represents a sub-sample of the total, two sub-samples adding up to the total sample of  $N = 30$  per chart.

The participants in the total sample expressed a general contact preference for emotionally close relationships, shown by average contact preference strengths significantly larger than zero (1.00 in a short-term perspective, 1.32 in a long-term perspective,  $t [29] = 6.09$  and  $9.55$ , respectively,  $p < .001$ ). The contact preference for emotionally close relationships also applied to each of the sub-samples ( $p$ -values  $< .02$  to  $< .001$ ).

The data were further analyzed using Repeated Measures ANOVAs. Independent variables were time perspective, age and subjective health. A significant main effect of time perspective showed that emotionally close relationships were more strongly preferred in the long-term than in the short-term perspective, by all participants regardless of age or health (total sample  $F [1, 29] = 5.36$ ,  $p < .03$ ).

Furthermore, a significant main effect of age showed that older participants had a stronger preference for emotionally close relationships than younger-older

participants did ( $F [1, 28] = 8.99, p < .01$ ). No effect of health was found: healthy and less healthy participants preferred emotionally close relationships to the same extent ( $F [1, 28] = 0.66, n.s.$ ). There were no time  $\times$  age and time  $\times$  health interaction effects.

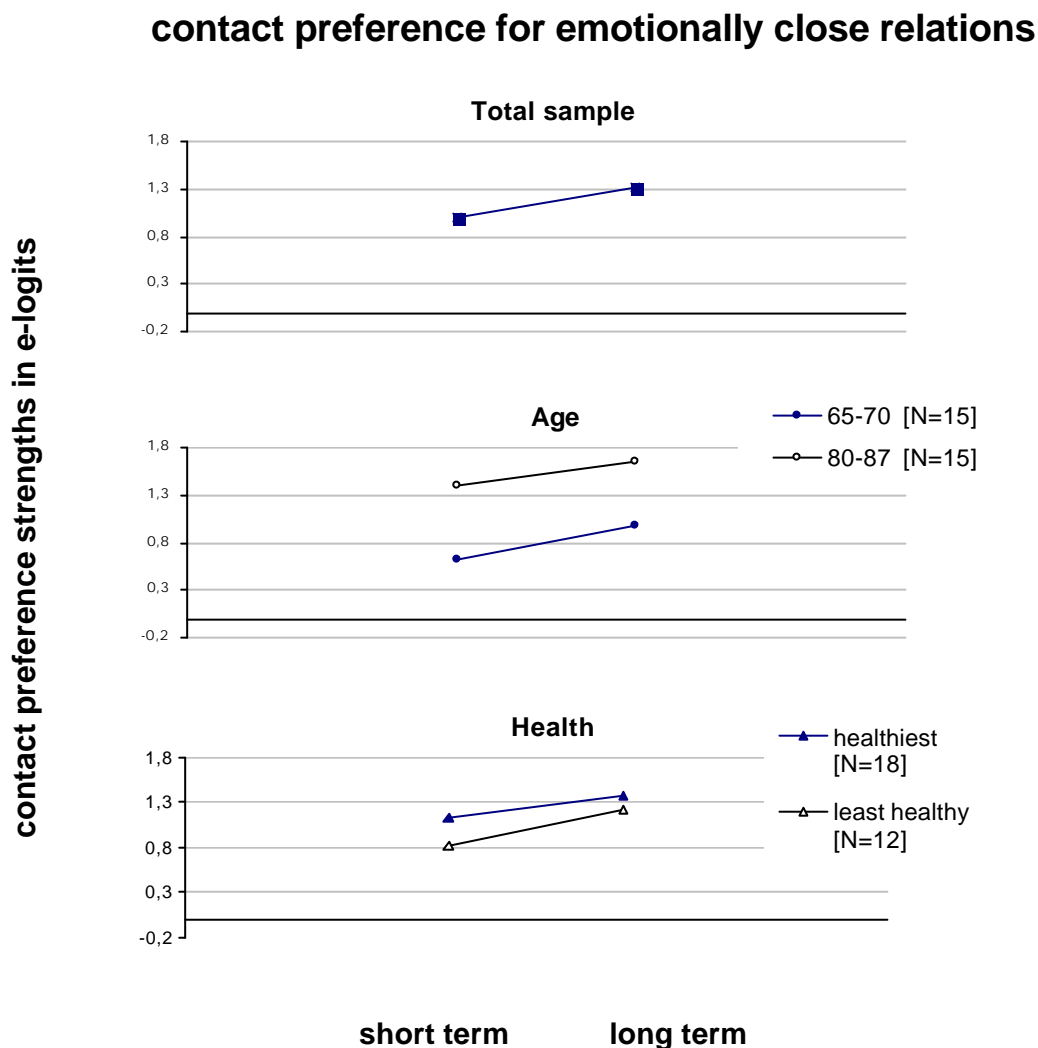
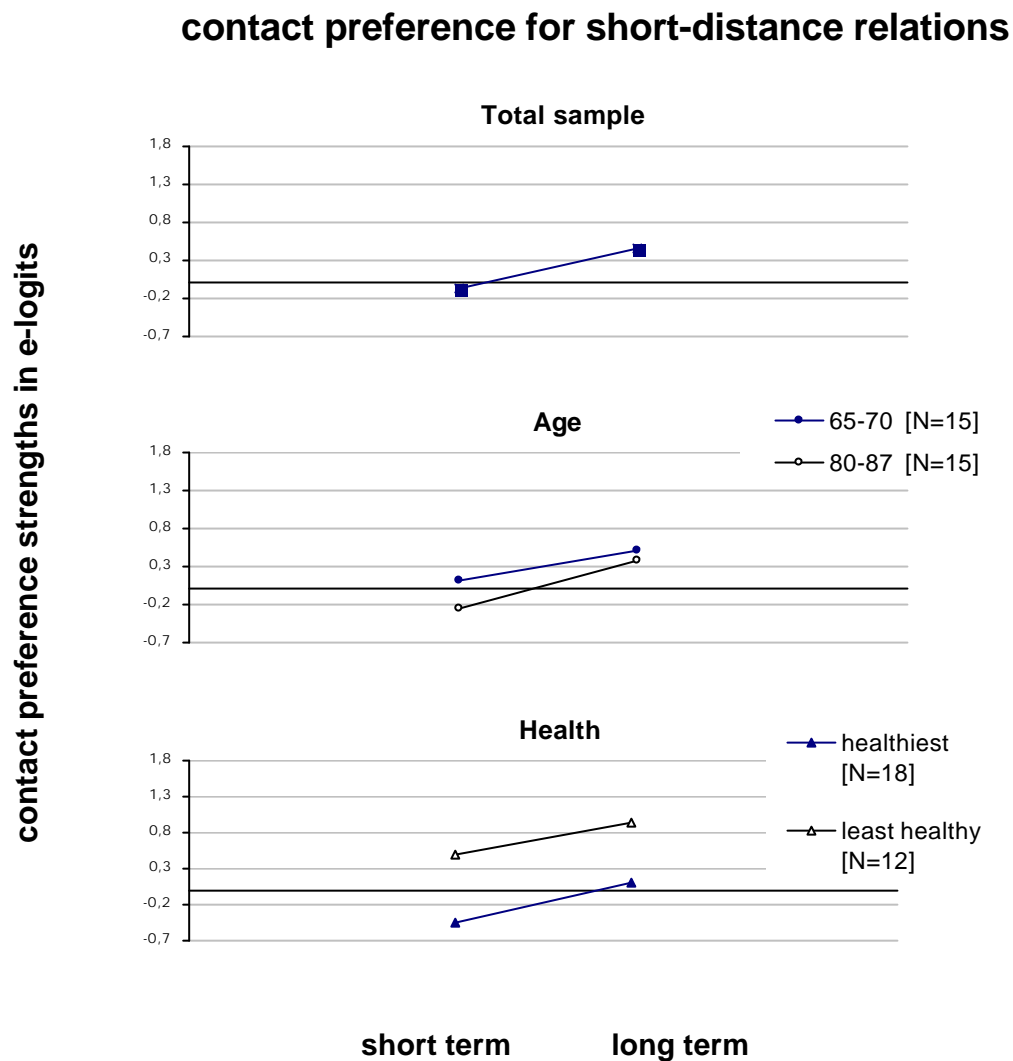


Figure 2.2: Contact preference strengths (in *e-logits*) for emotionally close relationships in the total sample and in sub-samples according to age and subjective health in a short-term and long-term perspective.

### ***Contact preference for short-distance relationships***

Figure 2.3 shows average contact preference strengths for short-distance relationships in the short-term and the long-term perspective. Again, contact preference strengths are expressed in *e-logits*, values  $> 0$  meaning contact preference for short-distance relationships and values  $< 0$  meaning contact preference for long-distance relationships.



*Figure 2.3:* Contact preference strengths (in *e-logits*) for short-distance relationships in the total sample and in sub-samples according to age and subjective health in a short-term and long-term perspective.

Participants in the total sample did not show a specific contact preference for long-distance or short-distance relationships in the short-term perspective (contact preference strength -0.06). The same applied to both age groups (contact preference strengths of 0.11 and -0.24,  $t [14] = 0.40$  and  $-1.12$ , respectively; *n.s.*). The health groups did show a difference, however. The relatively healthy participants preferred long-distance relationships in the short term (contact preference strength -0.44,  $t [17] = -1.96$ ,  $p < .05$ ), whereas the least healthy participants preferred short-distance relationships (contact preference strength 0.50,  $t [11] = 3.02$ ,  $p < .01$ ).

In the long-term perspective the participants in the total sample preferred short-distance relationships (contact preference strength 0.45,  $t [29] = 2.32$ ,  $p < .02$ ). The long-term preferences of the sub-samples were not significantly different from 0, with the exception of those in the least healthy group (0.94,  $t [11] = 4.93$ ,  $p < .001$ ). A Repeated Measures ANOVA showed a significant main effect of time perspective (total sample  $F [1, 29] = 16.81$   $p < .001$ ), indicating that relationships at smaller geographical distances were more strongly preferred in the long-term perspective than in the short-term perspective.

There was no significant main effect of age ( $F [1, 28] = 0.676$ , *n.s.*), showing that younger-old and old participants preferred short-distance relationships to the same extent. A main effect of health shows that less healthy seniors had a stronger preference for short-distance relationships than healthy seniors did ( $F [1, 28] = 7.80$ ,  $p < .01$ ). No interactions with time perspective were found.

#### **2.3.4 Qualitative results**

Comments from participants during the pair-wise comparison assignment revealed several considerations and motivations for their contact preferences. None of the arguments was specifically related to a particular sub-sample. The next few paragraphs address the considerations that were mentioned most frequently.

The perceived quality of relationships was the absolute main argument for not canceling a short-term appointment, as well as for not giving up a contact in the long term. The quality of a relationship was mostly expressed in terms of depth or intensity of the contact, in combination with close acquaintanceship through a shared history. The preferred visits themselves were qualified as intimate, enjoyable, and in terms of having fun. Of all 30 participants, 27 mentioned 'quality' arguments in the short-term condition, and 28 did so in the long term.

Arguments concerning geographical distance were often mentioned in relation to the 'sustainability' of the relationship and the usual contact frequency. Sustainability arguments such as one's own future capability to visit the other person considering health risks, or the other person's fragility, motivated 16 of the 30 participants to give up relationships in the long-term condition. Eight participants explicitly stated that distant contacts were vulnerable to health decline.

Twenty-two participants mentioned the exceptionality or rareness of a visit as an argument for *not* canceling appointments in the short term, whereas in the long term exceptionality was a motivation for 26 participants to give up relationships in favor of regular contacts. Activities and visits at shorter distances were mostly regular, whereas visits far away tended to be more exceptional.

There were 16 comparisons (out of 433 usable comparisons, see Table 2.3) in which the sustainability of the compared *activities* seemed to overrule the judgment of the inherent social relationships. In these examples the participants would rather give up playing tennis or traveling than walking or playing card games in the long term. In the short term the physically demanding activity was preferred because it was a means of keeping in shape, or a unique opportunity. Finally, responsibility towards other people, for example as a volunteer or in team activities like playing bridge, was mentioned as an argument for not canceling appointments in the short term. In long-term perspective this sense of responsibility concerned frail friends or relatives needing care and help.

## 2.4 Discussion

### 2.4.1 Social preference in terms of selectivity

#### *Contact preferences for emotionally close relationships*

Emotionally close relationships were generally preferred to not close relationships by all of the older adults participating in this study (figure 2.2). This general contact preference was to be expected as a bottom-line considering the advanced ages of all participants. Moreover, the significant main effects of time and age show the consistency of the data with Carstensen's socio-emotional selectivity theory. The older-old participants preferred the emotionally close relationship to an even greater extent than did the younger-old participants. Emotional closeness was generally more strongly preferred in the long-term than in the short-term, which indicates that the participants expected their own contact preference to develop toward more emotionally close relationships in the future.

Simply deducing from the theory, this effect of time should be stronger in older individuals than in younger-old, but no time  $\times$  age interaction was found. The data suggest that the predicted selectivity was already very advanced in the oldest group at the time of the study, shown by the oldest participants' selections

(see figure 2.1) being more saturated with emotionally close relationships than the younger-old participants' selections. In the experiment this saturation added to the probability of high general contact preference strengths for emotionally close relationships, especially in the oldest group. At the same time it reduced the probability of increments in the long-term condition, to a greater extent than in the younger-old group. This may explain why the expected time  $\times$  age interaction was not found.

The fact that we did not find a stronger increase of preference for emotional closeness in the oldest participants does not necessarily mean that it did not exist. It is likely that its consequences were already realized to a great extent in the current social selection, which reduced the chance of a further increase in this study. If the *actual* selection of emotionally close relationships also reflects *preference* for these relationships, as was implied by socio-emotional selectivity, these results are still consistent with the theory.

There was no effect of health. The relatively good physical condition of all participants in this study may explain why health was not a good predictor of selectivity regarding emotional closeness, even for the least healthy participants. In terms of the theory, age might have been felt to be a more obvious indicator for 'limited future time' than relatively good health. With respect to preference for emotional closeness, the effect of time may have applied to both health groups rather due to their advanced ages than their physical condition. Note that age and health were hardly correlated in this sample.

### ***Contact preferences for short-distance relationships***

Participants generally did not show contact preference for short-distance relationships in the short term and only a slight preference for short-distance relationships in the long term (figure 2.3). Relatively good health might explain their lack of concern about distance, even in a long-term perspective.

This seemingly negligible preference in the total sample for short-distance relationships should be regarded with more scrutiny, however. For example, the least healthy participants formed an exception, favoring relationships that are short-distance in both their short-term *and* long-term choices. In addition, the strong main effect of time showed that geographical distance was felt as an increasingly important feature of social relationships in a long-term perspective, and was taken into account by all participants when anticipating the future. Comments from the participants suggested a conscious anticipation that their vitality and mobility might become threatened by their health. The significant

effect of health, in contrast with the absence of a significant effect of age, further supported the assumption of a specific interrelationship between subjective health and contact preference for short-distance relationships.

The participants' verbal comments suggested an additional explanation for the lack of contact preference for short-distance relationships, especially in the short-term. A visit involving long-distance travel was usually considered to be exceptional and therefore special. In the short-term this was an argument to give priority to these visits, whereas in the long-term exceptionality rather indicated a disqualification.

There was no time  $\times$  health interaction, the explanation of which is similar to that of the lack of time  $\times$  age interaction for emotional closeness: the pre-selections of the least healthy participants were relatively saturated with short-distance relationships, thus preventing these participants from a *stronger* preference increase (compared to the healthiest participants) in the long-term perspective.

Inherent in the experiment is that contact preference strengths for social relationships were partly determined by the composition of pre-selections. However, these pre-selections most likely also reflected contact preference, in the form of *consequences* of (past and present) choices. The motivations for these choices might have been different regarding emotional closeness and geographical distance. Whereas the pre-selection of emotionally close relationships might reflect voluntary ('socio-emotional') selection, the pre-selection of short-distance relationships might rather reflect involuntary selection prompted by health decline. This assumption was supported by low overall contact preference strengths for short-distance relationships, in contrast with high overall contact preference strengths for emotionally close relationships. The next section will further elaborate on this point.

### ***Voluntary versus involuntary selectivity***

A question at the heart of this study is whether the composition of older adults' social networks is a result of voluntary social selection or rather a result of necessary adaptation. The gerontological literature shows the tension between both, as was noted in the introduction. The present observations also address this tension.

The pre-selections of the participants in the total sample (figure 2.1, top) show significantly larger proportions of emotionally close than emotionally not close relationships. The same applies to short-distance relationships; in the total

sample these are more strongly represented than long-distance relationships. However, as was noted above, the total sample's contact preference strengths for emotionally close relationships were substantially larger than zero, whereas the total sample's contact preference strengths for short-distance relationships were not (compare figures 2.2 and 2.3).

The 'exceptionality argument' cannot account for this contrast; certainly in the long-term condition, exceptionality and low contact frequency could have motivated very strong preferences for short-distance relationships. The relatively large discrepancy between the participants' pre-selections and contact preference strengths regarding geographical distance (compared to emotional closeness) suggests that the participants' pre-selection of emotionally close relationships corresponded better with 'voluntary' preference than did their selection of short-distance relationships.

Accordingly, the main effect of health in the preference data for geographical distance (lower part of figure 2.3) might be attributable to 'involuntary' selectivity and preference induced by a poorer physical health, for example. This seems plausible assuming that one's health and one's capability of bridging distances are correlated. In contrast, the main effect of age in the preference data for emotional closeness (figure 2.2, center) might be based on intrinsic quality, that is, the emotional closeness of the preferred relationships. This also seems plausible, assuming that in this sample age was the most distinguishing indicator for future time left and, as such, a predictor of socio-emotional selectivity.

### ***Geographical distance as a selector***

In the present framework, 'involuntary' choice was associated with geographical distance, gradually becoming an absolute barrier for maintaining social relationships due to a decline in health. However, the pre-selections of social relationships did not only suggest that distance seemed more of a barrier for the least healthy (compared to the healthiest) participants than for the older (compared to the younger-old) participants. They also suggested that this barrier affected the age groups differently. This was indicated by the extremely large proportion of emotionally close relationships within the distant contacts of the oldest participants. It was not the *number* of long-distance relationships that distinguished the older group from the younger-old, but the *kind* of long-distance relationships. Within the short-distance relationships of both age groups the proportions of emotionally close relationships were almost equal.

Interpreted in terms of *selective optimization with compensation* and *socio-*

*emotional selectivity*, 'focusing the energy available on the most valuable activities' was translated into 'only maintaining long-distance relationships if they are worth the trouble', which had different social consequences for the both age groups, however. The main reason for this might be the lower value assigned to emotionally not close relationships by the oldest adults, rather than their experience of higher absolute barriers to maintain them. Geographical distance might have acted as a 'passive selector', raising *subjectively* higher barriers for not close relationships when people get older and become more socio-emotionally selective.

#### **2.4.2 Limitations of the study**

The sample in this study was not representative of the current population of older adults. In particular, the oldest participants were probably fitter than 'average' persons of their age. Gender, health status and widowhood were almost equally spread over the age groups, which is not true for the population at large. The relevant variables age and health were controlled to a great extent, and the sample was homogeneous with respect to independent living. This means that the study cannot be used to generalize about the population as a whole, but is suitable for drawing conclusions about the mechanisms of interest. The conclusions about these mechanisms could be generalized at a more abstract level.

The participants' pre-selections of social relationships were construed for the pair-wise comparison assignment, rather than an exhaustive list of all of the participants' relationships. They gave an impression of the participants' currently 'active' contacts. As such, the pre-selections were incomplete and unbalanced representations of the participants' social networks. However, all participants were submitted to the same procedure, and the composition of the pre-selections was, to a great extent, based on their own choices. Therefore, systematic differences between pre-selections should be considered to be meaningful within the framework of this study, probably revealing the participants' contact preferences rather than the composition of their networks per se.

Cohort differences could have enlarged the effects found in this study. For example, younger-old participants might have perceived the barrier of a distance as being lower because of a higher mobility in the society in which they were raised. They might also have been more used to traveling than the oldest

generation. Another cohort-specific difference might be that the oldest generation holds *relatives* in relatively high esteem. This could indirectly have contributed to higher contact preference strengths for emotionally close relationships in the oldest age group: the oldest participants generally had a more positive judgement about their relatives (resulting in the label 'close') and might have expressed stronger preference for relatives because of their values.

The analyses of pair-wise comparisons were performed separately for the criteria emotional closeness and geographical distance. Analyses including *both* labels at the same time, for example comparison of 'close relationships long-distance' with 'not close relationships long-distance', would have been more efficient, but were not feasible. Participants did not necessarily compose pre-selections covering all of the four combinations of 'closeness' and 'distance'. In this study, a compound analysis would have lead to many missing values in particular sub-samples.

### **2.4.3 Conclusions and further outlook**

To summarize, the results of this study show that both time perspective and age directed the participants' contact preferences toward emotionally close relationships. In this sample, emotional closeness seemed to be a stronger predictor of social selectivity than geographical distance, partly because all participants were relatively healthy and independent, and could therefore 'afford' such selectivity. The study also indicates that adaptation processes played a role, suggested by the specific interrelation between health and preferences regarding geographical distance. The health differences within the sample were sufficiently large to reveal this tendency.

Finally, the study revealed an interesting interplay between social selectivity and the parsimonious use of energy. Although the oldest participants felt as healthy as the younger-old participants, and did not show significantly different distance preferences per se, they showed an extreme selectivity regarding contacts whose maintenance was physically demanding. Almost without exception these relationships were emotionally close. This effort-related selectivity was probably the expression of a relatively low perceived value of emotionally not close relationships, rather than the perception of an insurmountable physical barrier.

Reverting to the theory, the results of this study are most consistent with socio-emotional selectivity theory (Carstensen, 1991) and selective optimization

with compensation (Baltes & Baltes, 1990). Despite the fact that consciousness and experience of physical limitations obviously affected the participants' social choice, *selection* based on the intrinsic quality of relationships seemed to dominate and prevail over (other) adaptation mechanisms. The results of this study indicate that physical barriers will motivate older individuals to give up 'uninteresting' relationships in favor of more meaningful relationships, rather than finding ways to maintain all relationships at any price. They might feel the need for leveling physical barriers if these barriers start threatening their most valuable relationships.

The interplay between the (subjective and absolute) experience of barriers and a specific perception of socio-emotional value seems to play a central role in older adults' contact preference, also when anticipating their future. Further research could investigate older adults' weighing of *overcoming physical barriers* against *enjoying socio-emotional benefits*.

Regarding possible interventions, by means of e-mail or otherwise, this study generally suggests that it is not a lower barrier per se, but a 'reward' or 'value' that is the best motivator for older adults to overcome barriers, in terms of concrete geographical distances, but also in terms of using computers as a means to bridge distances. This means that *if* older individuals desire communicative support, they would appreciate enhancement of their most valued contacts, that is, emotionally close relationships. Within this category of close relationships long-distance contacts are the first nominees. Furthermore, the participants' comments suggested that they also valued the sustainability and regular availability of a contact. This might imply that they also would appreciate the consolidation of communications with existing contacts nearby, which does not necessarily mean the enhancement of contact *frequency*. Earlier studies (e.g., Carstensen, 1992; van Tilburg, 1998) indicated that in old age, contact frequency generally also diminishes *in* relationships, which may reflect older adults' aspirations and social needs, rather than their possibilities or competencies.

## References

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# 3

## Using the Internet selectively

### 3.1 Introduction

In the last few years a new generation has ventured online. Following a small group of senior pioneers, a growing proportion of the population above the age of 55 started accessing the Internet. In the Netherlands, for example, where this study was conducted, the proportion of Internet users aged 55 to 64 years increased from 9% in 1998, to 16% in 1999, and 26% in 2000. In the age-group 65 years and older, these percentages were only 3%, 6%, and 9%, respectively, which nevertheless meant a tripling of the numbers within two years (CBS, Statistics Netherlands, 2001).

The numbers show a growth, but also that a significant proportion of the older adults are not online. Many were just on the verge of retirement when the Internet became popular, and therefore did not automatically get introduced to Internet via their work, which might have encouraged or even forced them to learn about it. This makes the recently retired generation, usually 60+, a particularly interesting group for studying the adoption of a new medium, in this case the Internet, by an older population. Those who have gone online probably did so voluntarily, and chose to overcome possible barriers, such as working with a computer, whereas many of their peers did not. This study aims to gain an insight into the distinct motivations of these older users and non-users for using or not using the Internet.

Little research has been carried out in this area to date. Moreover, age related motivating factors for using or not to using the Internet have never been the points of departure for a study. The existing literature related to this topic shows this gap, but also indicates several plausible demotivating and motivating factors, for example the difficulty of handling the interfaces, and the relevance

and supportive potential of the Internet for older individuals.

Studies on training and usability issues show that age-related changes and declines of sensory and cognitive abilities (see Bengtson & Schaie, 1999, and Craik & Salthouse, 2000, for an overview) affect the ability to learn to deal with technologies like the Automatic Teller Machine (Rogers, Fisk, Mead, Walker, & Cabrera, 1996; Rogers, Gilbert, & Cabrera, 1997), computers (Czaja, Hammond, Blascovich & Swede, 1989; Charness, Schumann & Boritz, 1992; Kelley & Charness, 1995), and also to surf the World Wide Web (Cody, Dunn, Hoppin, & Wendt, 1999; Mead, Spaulding, Sit, Meyer, & Walker, 1997). Although older adults are certainly able to learn the necessary skills for handling new technological devices (e.g., Czaja, Guerrier, Nair, & Landauer, 1993), and adequate training programs increase their performance (e.g., Mead & Fisk, 1998; Rogers, Campbell, & Fisk, 2001; Rogers et al. 1996), on average it takes them more time than younger adults. They need more help (Kelley & Charness, 1995), and finally may perform less efficiently (Mead et al., 1997). In addition, generation-specific technology experience might impede the skill acquisition necessary to handle current user interfaces (Docampo Rama, 2001).

This implies that older individuals need to invest more effort to learn the skills necessary to benefit from a new medium like the Internet, while still running the considerable risk of not becoming competent within an acceptable period of time. This may affect older adults' willingness to start learning, as well as their perseverance in using new media. Nevertheless, several studies indicate that many older adults are open to new technology and are interested in using it (e.g., Rousseau & Rogers, 1998). Furthermore, experience in using computers positively affects one's attitude towards computers (Czaja & Sharit, 1998), and reduces anxiety about computers (Ellis & Allaire, 1999).

Another aspect is to understand the potential benefits of new media, in particular the Internet, for older individuals. For example, Czaja and colleagues (1993), and Morrell, Mayhorn, and Bennett (2000) mention the importance of the 'usefulness' of technology applications to make them attractive, especially to older adults. Researchers have suggested the many potential benefits of the Internet for older adults' communication and autonomy (e.g., Bikson & Bikson, 2001; Lawhon, Ennis, & Lawhon, 1996; Morrell et al., 2000; Trocchia & Janda, 2000; White et al., 1999; Wright, 2000). Social support and ease of communication with relatives and friends were seen as the most prevailing benefits, and were mentioned especially in relation to age-related physical constraints. Other

benefits suggested were access to medical information, for example, and the enhancement of independent living. However, these studies have not directly assessed whether older adults themselves perceive these potential benefits of the Internet.

The literature discussed above indicates that perceptions and experiences of both usability and usefulness might motivate or discourage older adults to use the Internet. Traditionally, failing ergonomics, inaccessibility and perhaps the novelty of new technologies were identified as major barriers and limitations for seniors. The improvement of computer and Internet usability, and the training of older adults to use the applications seem like feasible ways to level these discouraging barriers. Moreover, increasing the benefits –and also making them visible and plausible to older adults– appear to be indispensable preconditions to make the Internet attractive to seniors, and to motivate them to go online.

One assumption in this study is that, besides the perception of usability, the perception of the benefits of a medium largely contributes to whether or not it is used. The perception of benefits might be reflected in the evaluation of a medium for several specific communication purposes. Different media evaluations related to different communication goals might therefore identify relevant criteria by which to determine the perceived benefits of traditional and new media.

Another assumption is that experience in using a medium will probably influence its evaluation, as suggested by some studies on computer attitudes (e.g., Czaja & Sharit, 1998). Experienced Internet users generally view the Internet more positively.

Finally, the media evaluations were expected to differ for different types of communications. These differences per communication type may vary between experienced users, less experienced users and non-users.

In conclusion, the research question in this study was the following: Do evaluations of traditional media versus the Internet differ between older Internet users with different amounts of experience and non-users, and, if they do, in what sense? Based on the above-mentioned assumptions, three hypotheses were formulated: (1) The evaluation of a medium is positively related to experience in using it; a higher amount of Internet experience predicts a higher overall Internet appreciation. (2) The evaluation of a medium depends on the purpose of the communication, in other words, it is goal-related. (3) The goal-related evaluations differ between user groups with different amounts of Internet expe-

rience (User Group  $\times$  Goal interaction). How particular media evaluations are related to particular goals, and also in what sense goal-related evaluations differ between groups, were two open questions in addition to these hypotheses.

To investigate the media evaluations, three groups of older adults with different amounts of Internet experience compared Internet applications (e-mail and searching the Web) with traditional communication methods like the telephone, the regular mail, guides, and reference works, for different communication purposes. The methodological choice for *comparisons* of Internet applications with traditional media -instead of judging Internet applications in isolation- was made because a pilot study indicated that judging the 'new' media almost automatically evoked a comparison with existing, traditional ones. It seemed not only unnatural just to ask for evaluations of Internet applications without any traditional reference point, but also better to make the unavoidable comparison explicit and thus standard across all participants.

## 3.2 Method

### 3.2.1 Participants

Thirty older participants aged between 60 and 74 ( $M = 65.7$ ,  $SD = 4.4$ ), 16 men and 14 women, volunteered in this study. All were living independently. Ten were experienced users of the Internet, ten were inexperienced users, and ten explicitly refused to use the Internet. Participants were assigned to user categories after a brief interview, based on a checklist.

Experienced users had at least two years of Internet experience, had access at home, spent at least two hours per week online (according to their own estimations), and reported to feel rather comfortable with the medium. Most of them were also teachers or helpers in senior Internet classes. Inexperienced users had less than two years experience, usually did not have access at home, spent less than two hours per week online, and reported not really feeling comfortable yet. An Inexperienced user in this study could meet at most one criterion of the Experienced user, and vice versa. For example, someone with more than two years of Internet experience, but no access at home, spending just half an hour a week, and reporting to feel like a beginner, was considered to be Inexperienced. Another volunteer with just one year of Internet experience, but using the medium at home on a daily basis, and with a quickly developed expertise that enabled him to even teach peers in a senior Internet class, was considered to be Experienced. Refusers did not use the Internet, and explicitly stated that they

did not plan to either, but nevertheless had some general idea about its applications. They had heard of the Internet and e-mail, and could give examples of what the medium could do. Both Experienced and Inexperienced users were recruited from senior Internet classes (teachers as well as participants). Most of the Refusers were good friends or relatives of the volunteering users, which implicitly provided some general familiarity with Internet applications.

The mean ages in the three groups were 64.1 years, 66.7 years, and 66.4 years, respectively. The educational levels were equal; the average was about four years at High School and an additional professional education, but each group also had one or two participants with a Bachelors or a Masters degree. The groups differed with respect to gender; the Experienced group was mostly made up of men (80%), whereas the Refusers were mostly women (80%). Six of the Inexperienced users were men and four were women.

Table 3.1

*Participant characteristics per user group*

	user group		
	experienced	inexperienced	refusers
mean age	64.1	66.7	66.4
males/ females	8/2	6/4	2/8
mean length of experience (years)	3.1	0.5	--
% with access at home	100	20	40*
mean time/ week online (hours)	6.6	1.8	--
% feeling comfortable	100	40	--

\* husband or wife uses the Internet

**3.2.2 Procedure**

In a one-hour interview, the participants were asked to judge applications of the new media, specifically e-mail and surfing or searching the Internet, versus more traditional methods like telephone, regular mail, guides, and reference works, for satisfying communication and information goals in four different domains. The choice of these domains was based on previous work and on additional exploratory interviews with two older Internet teachers about the most common applications of the Internet in their classes. The selection is also

consistent with the usage patterns found in the survey by Morrell et al. (2000).

The four domains were (A) communicate to keep in touch with someone that you know personally, for example to check that they are ok, (B) communicate for practical purposes with another person that you know, for example to arrange an appointment, or to send a message, (C) acquire information about leisure activities, personal interests, or just for fun, and (D) acquire information about public services, companies, or business.

The participants were asked to mention two concrete communication or information goals per domain, that had occurred, or could reasonably occur, in their everyday lives. In this way, each participant gave  $4 \times 2 = 8$  personal examples of communication goals. Next, for each of these goals the participants indicated the traditional communication method that they would most likely use, and also the most likely 'new' equivalent. For example, for acquiring information in domain (D) participants might report needing to find out where to get a flu shot. They might report that they would use the telephone to call the health center, *and* describe how they could use the Internet to find the answer. The Internet Refusers were also expected to have this capability, since a criterion for them to participate in this study was having some knowledge about the medium, even though they refused to use it.

Once they had established their eight communication and information goals, and also the traditional versus 'new' methods of satisfying them, the participants were asked, per goal, to indicate which of each methods they valued most on a 6-point scale (0-5), supposing that both were available. A higher value indicated a more positive evaluation of the new method. The participants were asked for a general preference for one or the other method, intuitively applying criteria that they considered most relevant for the situation. For example, for personal communications 'intimacy' might be important, whereas for making an appointment the major judgment criterion might be 'speed'. The participants were encouraged to elucidate their preferences verbally.

The interview concluded with three open-ended questions for the Experienced and the Inexperienced users about their Internet use. These questions aimed to get an impression of how the participants got acquainted with the medium, what they considered as especially valuable versus useless applications, and the establishment of e-mail and the Internet in their social environments. The Refusers answered a slightly different set of three questions, about why they did not use the Internet, if they could imagine any advantages,

and also about the use of the Internet in their social environments. Additional comments were also noted. The participants received 15 Dutch guilders for their time and cooperation.

### **3.3 Results**

The participants had no problems coming up with two goals per domain; only three participants mentioned a total of seven instead of eight examples. Except for these persons, each of the four domains yielded two concrete examples of communication and information goals, and accordingly two judgments about the communication methods of choice (eight judgments in total per participant).

The concrete communication examples differed between participants. However, it was easy to abstract these examples and assign them to main categories. For example, within domain (A) 'communicate to keep in touch with someone that you know personally, for example to check that they are ok', a participant gave the two examples: 'write and e-mail (respectively) my brother in Australia', and 'call and e-mail my granddaughter in Paris'. Other participants gave two examples of communications with friends or relatives within the country or one example of communications abroad and one example nearby. The corresponding goal categories ('Goals') representing domain A were labeled as follows: Goal 1 'keep in touch with friends and relatives who live some distance away in the same country', Goal 2 'keep in touch with friends or relatives abroad'. The examples above illustrate that participants did not necessarily mention one example corresponding with Goal 1 and one example corresponding with Goal 2; sometimes both examples fell under the same Goal. In that case the other category did not apply.

The same kind of differentiation and selection applied to domain B. The corresponding goal categories were Goal 3 'make an appointment or arrange a time for an activity (interactive communications)', and Goal 4 'send information to friends, relatives or acquaintances (one-way communication)'.

The two examples mentioned within domain C were always very similar both per participant and between participants; only the subjects were different (e.g., searching for information about book titles, growing plants, collecting stamps, etc.). These examples were therefore assigned to one goal category, Goal 5: 'find information about leisure activities, medical issues, and personal interests'. The same applied to the two examples in domain D, both assigned to Goal 6: 'find information about public services, companies, or business.' The

further analyses were based on this categorization of six communication and information goals. Columns three to six in Table 3.2 show the numbers of given communication and information examples per domain (A, B, C, D) fitting into the six goal categories, per user group.

Table 3.2

*Numbers of mentioned communication and information examples (left) and evaluation scores (right) per domain and goal category, per user group*

		numbers of communication and information examples				numbers of evaluation scores			
		user group				user group			
domain	goal	exper.	inexp.	refus.	total	exper.	inexp.	refus.	total
A	1	9	15	16	40	7	9	10	26
	2	10	5	4	19	7	4	4	15
B	3	10	10	10	30	10	10	10	30
	4	10	9	10	29	10	9	10	29
C	5	20	20	20	60	10	10	10	30
D	6	20	19	19	58	10	10	10	30
	other	0	1	0	1	0	1	0	1
	total	79	79	79	237	54	53	54	161

The numbers of mentioned examples assigned to the goal categories 3, 4, 5, and 6 did not substantially differ between user groups. However, the distributions of numbers in Goal 1 and Goal 2, both belonging to domain A about intimate communications, were significantly different between the three user groups, according to a Chi-square Test of Homogeneity ( $\chi^2(2) = 25.03, p < .001$ ). Both the Inexperienced users and the Refusers mentioned fewer examples of long-distance intimate communications (5 and 4, respectively) than the Experienced users (10).

Each participant contributed one evaluation score per Goal. If participants mentioned a similar example twice, the two corresponding media evaluations were averaged, and were counted as one. For example, the Inexperienced users mentioned 15 examples fitting into Goal 1 (see column four in Table 3.2). Six of these Inexperienced users mentioned two almost identical examples, of which the evaluations were averaged per person. The six average evaluation scores and the remaining three (single) evaluation scores add up to nine evaluations in total for Goal 1 in the Inexperienced group (see column eight). Columns six to nine in Table 3.2 show the numbers of media evaluations after averaging the 'double' scores per participant.

We can see from Table 3.2 that six evaluation values were missing in the Experienced user group: three in Goal 1, and another three in Goal 2. The Inexperienced group missed eight values (the value in 'other' was treated as missing too) of which six in Goal 2. In the Refusers group all six missing values occurred in Goal 2.

### ***3.3.1 Evaluations of media according to goal and user experience***

Table 3.3 (next page) shows the participants' evaluations of traditional media versus the Internet. As described above, each participant contributed at most one evaluation score per communication goal, on a scale from 0 to 5. A cell in Table 3.3 represents these evaluation scores, averaged per user group.

Obviously, the concentrations of missing values in Goal 2 had consequences for the statistical analyses. Two Repeated Measures MANOVAs were carried out: one in which the missing values were filled up with the Grand Mean (thus disproportionately affecting the scores of the Refusers group), and another in which the missing values were left open, but mostly eliminated by excluding Goal 2 from the analysis.

Table 3.3

*Average ratings of traditional media versus the Internet, according to Internet experience (user group). Individual scores ranged from 0 (traditional medium valued most) to 5 (new medium valued most)*

goal	user group			total sample
	experienced	inexperienced	refusers	
1 keep in touch nearby	0.70	1.50	0.00	0.71
2 keep in touch abroad	3.00	1.88	0.50	1.91
3 make an appointment (interactive)	2.70	0.20	0.00	0.97
4 send a message (one-way)	3.70	2.88	0.20	2.21
5 find information (leisure)	2.50	1.45	0.35	1.43
6 find information (services)	2.75	2.00	0.35	1.70
average 1-6	2.64	1.56	0.20	1.47

In both cases, a significant main effect of User Group was found,  $F(2, 27) = 28.94$ , or  $F(2, 23) = 31.07$ , respectively,  $p < .001$ , meaning that the overall evaluation of the media depended on belonging to a user or refuser group. Bonferroni Post Hoc Tests showed significant differences between the scores of all groups ( $p < .01$  to  $p < .000$ ).

A significant main effect of Goal was shown by both analyses,  $F(5, 23) = 5.89$ ,  $p < .001$ , or  $F(4, 20) = 4.13$ ,  $p < .013$ , respectively, meaning that the evaluations of the media also depended on the specific purpose of the communication. Next, a Contrast Analysis was carried out for Goals, without Goal 2. This analysis showed a significant deviation of Goal 1 and Goal 3 below the mean scores of Goal 1, 3, 4, 5, and 6 ( $F(1, 23) = 8.59$ ,  $p < .01$  and  $F(1, 23) =$

6,19,  $p < .02$ , respectively), and of Goal 4 above the mean ( $F(1, 23) = 12.77$ ,  $p < .002$ ). The deviations of Goal 5 and Goal 6 were not significant.

Besides the two main effects there was also a significant User Group  $\times$  Goal interaction:  $F(10, 48) = 2.54$ ,  $p < .015$  (Goal 2 included), or  $F(8, 42) = 2.31$ ,  $p < .038$  (Goal 2 excluded).

### 3.3.2 *Specific goal-related and experience-related patterns in the data*

As shown in the User Group  $\times$  Goal interaction, the differences between user groups were not observed to the same extent in each Goal. The scores of the three user groups in Goal 5 and Goal 6 followed the order of the main effect of the User group: Experienced Users  $>$  Inexperienced Users  $>$  Refusers. The scores for Goal 3 and Goal 4 also kept this order, but the patterns were very different. For Goal 3, the evaluations of Inexperienced users and Refusers were similar, and both contrasted with those of Experienced users. For Goal 4 the scores of both user groups contrasted with the Refusers' scores. Goal 1 violated the order of the Main effect: the Experienced group valued the new media *lower* than the Inexperienced. The scores for Goal 2 were excluded from these analyses because of missing data.

### *Qualitative results*

The concluding interviews revealed diverse ways in which the Internet users had become acquainted with the Internet. An external incentive had often helped them to start, for example a free senior Internet course in a senior home nearby, son or daughter who gave them a computer, or an Internet provider calling with a special offer. In these cases the (future) user was already interested in the new medium. On the other hand, the stories of enthusiastic e-mailing and Web-searching relatives and friends seemed not to have convinced the Refusers. Their major reason for not going online was that the Internet had absolutely no use for them (eight Refusers out of ten mentioned this argument). In addition, six Refusers mentioned 'other priorities', both financially and in their occupations. A final reason, explicitly mentioned by three of the Refusers, was the trouble or fear of handling the computer. However, three of the Refusers also spontaneously stated that fear of handling the computer was not the reason for not using the Internet.

Both the Experienced and Inexperienced Internet users generally considered e-mail as one of the most valuable and useful applications of the Internet.

However, the voluntary comments during the interview revealed nuances. Five of the Experienced users and three of the Inexperienced users mentioned that e-mail was 'too cold' or 'impersonal' in the specific context of Goal 1, intimate short-distance communications. They did not mention this objection when judging e-mail in the context of Goal 2, intimate communications abroad. Five of the Inexperienced users found e-mail 'too slow' or 'impractical' for setting appointments (Goal 3), mostly because the other parties did not regularly check their mailboxes. In addition, another highly valued application of the Internet mentioned by Experienced and Inexperienced users was searching for information, preferably not by surfing, but in a goal-oriented way. 'Chatting' was mentioned as particularly useless. Both the Experienced and Inexperienced Internet users unanimously felt it to be nonsense and a waste of time.

The Refusers also saw some benefits. Two of them could imagine the charm of e-mail to communicate with close relatives living far away, and another two mentioned the usefulness in the case of handicap or immobility.

Finally, the use of e-mail by peers was also mentioned as an argument to use or not to use e-mail. All but one of the Experienced users lived in a social environment with many Internet users. The Inexperienced as well as the Refusing participants mostly reported that few people around them were online, though their numbers were growing. Some of the Inexperienced users explicitly regretted this low Internet activity in their social environments.

### **3.4 Discussion**

When do seniors choose the Internet? This study shows that the appreciation of traditional and 'new' media (Internet) depends on (1) the amount of Internet experience and (2) the specific purpose of the communication. More Internet experience predicts a higher overall Internet appreciation, but the media evaluations differ between goals. In addition, different user (or non-user) groups perceive the applicability of media differently depending on the communication situation. These findings are consistent with the three initially formulated hypotheses.

The positive relationship between Internet experience and evaluation is not surprising, and is also in line with the literature (e.g., Czaja & Sharit, 1998; Ellis & Allaire, 1999). The Internet Refusers showed an overall Internet aversion, illustrated by an evaluation score of almost zero (0.2). The Inexperienced users judged the new medium more positively, but still tended to favor the traditional

method most of the time (1.56). The Experienced users, however, stated that they slightly prefer the new to the traditional methods (2.64).

The main effect of the Goal also seems to be easy to interpret. The effect was mainly based on two Goals yielding Internet evaluations significantly below average, and on one Goal yielding a score significantly above average. Below average were Goal 1, 'keep in touch with friends and relatives who live some distance away in the same country', and Goal 3, 'make an appointment or arrange a time for an activity'. These Goals were both of an interactive nature. Moreover, Goal 1, with the lowest score on e-mail, also represented a very *personal* kind of communication. In contrast, Goal 4, 'send information to friends, relatives or acquaintances', yielded above average Internet ratings. This Goal concerned one-way communication of a practical kind. E-mail, not typically personal and interactive especially when compared to the telephone, was therefore unsuitable to be used for Goal 1 and Goal 3, but it could be an improvement on the traditionally used, slower regular mail for Goal 4. The above-mentioned contrasts between Goals showed that evaluation scores were consistent with properties of the communication and properties of the methods of choice. The question now is whether this interpretation is in line with the patterns of all user groups.

### ***Differential effects of Goal***

The patterns in Table 3.3 clearly illustrate a User group  $\times$  Goal interaction: the expected experience-related hierarchy of evaluation scores did not apply to all goals to the same extent. For example, for 'sending a message' (Goal 4), both Experienced and Inexperienced users considered e-mail as a suitable method, whereas for 'making an appointment' (Goal 3) the Inexperienced users agreed with the Refusers, and rather preferred the traditional method, in this case the telephone. The Experienced users still considered e-mail for Goal 3.

These different conceptions may be explained by the establishment of e-mail in the social environments of the both user groups. To reach the desired interactivity to quickly arrange an appointment, the other party or parties should be online on a regular basis as well. This appeared often to be the case in the Experienced user group, indicated by the answers in the concluding interviews, but not (yet) in the Inexperienced group. This made using e-mail to set up an appointment easy for the Experienced, but practically useless for the Inexperienced users. For sending a one-way message, time-requirements were seen as

less important, and both groups considered e-mail for this purpose.

Another interaction effect was observed in Goal 1, showing that the Internet was not necessarily most valued by Experienced users in all situations. None of the groups really preferred the e-mail as the primary method for personal, intimate communications within the country, but the Experienced users did even less than the Inexperienced. Comments of participants in both user groups indicated that e-mail was felt as impersonal and cold compared to the telephone. Apparently, interactivity and use in the social environment were not the only criteria for valuing the medium; some communications also demanded intimacy.

One other reason for not using e-mail might have been the absence of a communication goal for which it was particularly suitable. Goal 2, 'keep in touch with friends or relatives abroad', was illustrative in this respect. For many of the participants this goal did not seem to be very prominent. It is particularly interestingly that the Inexperienced users and the Refusers mentioned significantly fewer examples of contacts abroad than the Experienced users (see Table 3.2). The concluding interviews, however, indicated that the advantages of e-mail in this context were certainly recognized, even by two Refusers who did not mention examples of friends or relatives abroad. They could imagine advantages of e-mail, supposing that contacts abroad were an issue.

To summarize, the evaluation of new media depended on different criteria in different situations, in principle recognized by all participants regardless of experience. Sometimes the consideration of these criteria led to similar media evaluations in all groups, sometimes to different evaluations. It was not only the match between relevant medium properties and the demands of the communication that seemed to have influenced these evaluations, but also external factors like the availability of the medium in the social environment and the prominence of a particular communication purpose. Using the participants' own everyday-life examples in this study focused their considerations on communications that were relevant and realistic from their perspectives.

A limitation of the present study was probably an overestimation of the overall appreciation of the new media. For example, an average evaluation score of 2.64 in favor of the Internet (in the Experienced users) where 2.5 was the middle, seemed fairly high for a medium that can only serve part of one's communication needs. Indeed, the scores did not represent the participants' preferences regarding their *total* communication repertoire, and the data were based on a selection of communication and information goals, without weighing

their occurrence in everyday life. Keeping in touch with the geographically close social environment and the option of personal visits were not included. These are situations in which the traditional method cannot be beaten by any new alternative. Also, searching for information may not occur as frequently, and not be as prominent, as, for instance, staying in touch with relatives. Nevertheless, the data allowed us to differentiate between groups and between goals, which was the purpose of this study, rather than to generate absolute judgment scores.

Another comment concerns the low, but sometimes still above-zero evaluation scores of some Refusers. This seemed strange, because Internet Refusers would inherently reject any Internet application, and thus always choose in favor of the traditional media. The concluding interview provided insight: even Refusers could imagine advantages of the Internet, not leading them to use it, but maybe to mitigating their judgments on some occasions.

### ***Benefits***

In this study the participants rated 'value'. Although it was expected that benefits would play a major role in the evaluation of media, no specific criteria for 'value' were established or defined beforehand. This implied that participants were not confined to particular conceptions of 'value', but could interpret 'value' in a way that they deemed applicable to the medium in a communication situation. Especially in the concluding interviews, but also during the media assessments, they had the opportunity to mention positive as well as negative aspects of the media under consideration. Negative remarks addressed ergonomic, skill-related and accessibility problems. However, the participants' arguments and considerations mainly referred to positive goal-related media characteristics or the *lack* thereof. These characteristics seemed to make a particular medium more or less valuable and appealing in a communication context. In other words, the participants' spontaneous conception of 'value' was mostly in terms of benefits, rather than in terms of limitations, and supported the relevance of this 'positive' concept.

Reverting to the literature discussed in the introduction, the findings of this study corroborate that access to medical information is a valuable application of the Internet for older users. Furthermore, two participants suggested the potential enhancement of independence. However, the advantage of social support and easy communications with relatives and friends, also frequently assumed in the literature, was not so obvious to the participants in this study. They

preferred the traditional telephone for these communications, mainly because of the personal touch, as indicated by their verbal comments. E-mail was only considered for intimate communications with relatives and friends overseas.

Apart from the fact that the participants in this study were all healthy, mobile and living independently, the specific geographical situation of the Dutch may explain the relative reluctance of the participants to use e-mail for personal communications. Except for some foreign relations, relatives and friends do not really live far away, and distances can relatively easily be bridged, by phone as well as physically. In this respect, the Dutch situation is not comparable to the United States, where most of the other studies reported in the literature were carried out. E-mail is a tremendous asset when dealing with different time zones, and keeping in touch with scattered relatives and friends all over the country. In addition, an explanation for the relatively low Internet use among the Dutch seniors might be this relatively low Internet use itself. This idea was supported by complaints of Internet users about the low Internet activity in their social environments, making e-mail less useful for their everyday communication.

However, there is another possible explanation for the difference between the literature and the current observations. This explanation is of a gerontological, rather than cultural or practical kind. It addresses promises like 'new opportunities for communication that can help older adults to avoid social isolation' (White et al., 1999, p. 358), Internet opportunities of 'meeting new people', and the chat room being 'a forum to make new acquaintances' (Trocchia & Janda, 2000, p. 610). The mentioned studies did not provide a thorough empirical basis for these suggested 'benefits'. Moreover, the assumed benefits are not very consistent with currently available gerontological research.

Assuming that social relationships are important to everyone's social and emotional well-being, Internet may support this well-being by bridging distances between relatives and friends. Age-related threats like declining vitality and the risk of immobility, for instance, also in the peer group, cause physical distance to grow subjectively. Under pressure of physical distance the perceived benefit of e-mail will most likely increase, even for intimate communications, as was shown in this study.

However, the problem of age-related network shrinkage, partly due to relatives and friends dying, will probably not be solved by the Internet. There is extensive gerontological evidence for an age-related tendency towards

selectively and voluntarily limiting the social network. Maintaining a few emotionally close, old relationships has priority, rather than to extend the social network by making new friends (e.g., Carstensen, 1991; Fung, Carstensen, & Lutz, 2000; Lang & Carstensen, 1994). This tendency predicts, also with regard to the problem of *involuntary* network shrinkage and subsequent loneliness, few substantial benefits from chat rooms for lonely older adults, for example. The participants in this study considered chat rooms to be superficial and anonymous, and therefore valued them very poorly. The benefits of new Internet contacts are likely to be limited from the perspective of many older adults, if they were to seek these contacts at all.

In conclusion, the benefit of a new medium, in this case the Internet, depends on many factors, including the purpose of the communication, the establishment of the medium in one's social environment, but also in society as a whole, and of course on user-specific characteristics, such as skills and preferences. Most of these factors are not age-related per se, but their weight and interpretation may change when people get older. For example, emphasis on emotionally close relationships, and the inherently desired intimacy, may influence the perception of the Internet as an adequate and appropriate communication channel. Another example is the current, practical situation of relatively few older adults being online, which also affects the usefulness of the Internet to older Internet *users*. Furthermore, a lack of skills discourages the use of Internet, and older adults in particular feel that acquiring them involves considerable investment of effort and time.

How should the results of this study be considered in a broader and longer-term perspective? Many of the above-mentioned barriers and objections are temporary and will probably disappear in a few decades. The accessibility of the Web may be improved, devices may become user-friendlier, and all generations will grow up with the Internet and use it naturally. In addition, the current approach of the Internet compared to traditional methods may no longer be relevant; the Internet will *add* to the existing spectrum. Or, as Bikson and Bikson (2001, p. 145) argue: "In any case, it is evident that the Internet infrastructure is not a simple substitute for in-person contact, telephone calls, print correspondence, or any other more conventional medium. Rather (...) messaging establishes a quite distinct avenue for exchange whose nature is still unclear and evolving." Internet communication is of another kind, with yet unknown opportunities and benefits, also for seniors.

This study indicates a distinct, selective use of the Internet by older users, which may also hold in the future. Their media evaluations seem largely to depend on perceived merits of a medium for their own communications. These merits, or benefits, seem to be determined by the salience of particular communication purposes in everyday life and the specific demands inherent in these communications. Knowledge about media characteristics that older users find important for different communication purposes may provide a direction for future development of Internet applications and other new communication methods, so that older users can also take advantage of these media.

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# 4

## **The role of costs and benefits in judging new and traditional media\***

### **4.1 Introduction**

New communication technology has the potential to provide a physically undemanding bridge between relatives and friends. The question is whether such a 'bridge', for example e-mail, is also capable of helping older adults to maintain their most valued relationships. And are the perceived advantages of the new communication technology large enough to outweigh possible barriers such as novelty and learning how to operate new equipment, particularly from a senior's point of view?

The studies in chapters two and three shed light on these questions, and suggested that older adults make a cost-benefit analysis, determining both their social preferences and their media preferences. The perceived merits of a communication method also appeared to relate to communication goals and communication contexts. The third study, presented here, was designed to examine the wider implications of the first two studies.

This study examines the motivating factors for older individuals, e-mail users and non-users, to apply different communication methods in various personal (not businesslike) communication scenarios. There are three assumptions, based on the previous studies. Firstly, perceptions of 'cost' and especially of 'benefit' motivate older adults' decisions about media. Benefits are expected to weigh more heavily than costs. Secondly, in accordance with the study in chapter 3, the motivating factors for using a medium are assumed to depend on the goal of the communication, and therefore to vary between different communication scenarios. And finally, the assessment of e-mail, a relatively new

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\*This chapter is based on Melenhorst, A.S., Rogers, W.A., & Caylor, E.C. (2001).

medium providing new communication opportunities, might give an insight into what would motivate older adults to adopt a new communication technology. It is assumed that the amount of email experience affects the participant's motivation: e-mail users are expected to judge e-mail more positively (see the study in chapter 3 about media use).

An additional goal of this study is to get an impression of the generality of the concepts examined. For this reason, the seniors participating in this study were of different nationalities (American and Dutch) and different ethnic origins (African American, Caucasian, Hispanic, and other).

The Focus Group method (Krueger, 1994) was chosen for this experiment because of its structured and semi-open procedure, which focuses the participants on the topic of interest and at the same time gives room for their own comments. While retaining the merits of the Focus Group method (such as the stimulating effect of the group interaction and the moderator's flexibility to ask relevant follow-up questions; see Rogers, Meyer, Walker, & Fisk, 1998, p.121, for example), the traditional procedure was modified so that it optimally served the purpose of our study. First, the group interviews were scenario-based instead of question-based. The scenarios provided examples of representative everyday-life communication contexts, which facilitated the generalization to personal experiences. In addition, the group size was reduced to four instead of the more usual six to eight participants per group. This reduction increased the speaking time per participant and enabled in-depth discussion among all participants. The moderator was part of the circle to further enhance the group discussion.

The construction of the coding scheme for the analyses was partly data-driven and partly concept-driven: the conceptual framework of the previous studies determined the perspective of the analyses to some extent.

## **4.2 Method**

### ***4.2.1 Participants***

The American focus group participants consisted of 48 independently living older adults in the age range 65 to 80 ( $M = 71.2$ ,  $SD = 4.9$ ), 29 women and 19 men. Twenty-five percent were African American, 10 % Hispanic, and 65 % Caucasian. Participants were selected from research volunteer pools in Atlanta, Georgia, and in Miami, Florida. The 13 focus groups consisted of three to five (average slightly below four) participants. Eight groups were conducted in

Atlanta and five in Miami. Six groups consisted exclusively of e-mail users, five groups exclusively of non-e-mail users, and two groups of all but one non-e-mail users. The latter were counted as non-email groups. The American participants received \$25 for their participation.

The Dutch participants consisted of 20 independently living older adults in the age range from 65 to 80 ( $M = 71.1$ ,  $SD = 3.9$ ), 9 women and 11 men, 80% Caucasian and 20% with another ethnic origin. They were selected from research volunteer pools. The focus groups consisted of four participants, two groups of e-mail users and three of non-e-mail users. The sessions were conducted in Eindhoven in the Netherlands. The volunteers received 25 Dutch guilders for their participation. See Table 4.1 for more details.

Table 4.1

*Numbers of focus group participants according to nationality, gender, and e-mail use*

	United States		Netherlands		total
	e-mail	no e-mail	e-mail	no e-mail	
sessions	6	7	2	3	18
males	10	9	4	7	30
females	13	16	4	5	38
total participants	23	25	8	12	68

#### **4.2.2 Procedure**

Participants filled out a questionnaire to supply demographic and background information. At the beginning of the session they received scenario booklets containing nine everyday communication scenarios. The scenarios were put together systematically, based on earlier studies and several pilot sessions, and can be considered as being representative of the most relevant everyday-life communication contexts for older adults. Refer to Table 4.2 for an overview of the scenarios, and to the appendix for full descriptions of the scenarios. Contact frequency, emotional closeness of the relationship, and the specific goal of the

communication were systematically included. The moderator introduced the variable 'geographical distance' in scenario 1 during the discussion.

Table 4.2

*Nine communication focus group scenarios (brief descriptions)*

No.	Scenario
1a	Keep in touch with friends and relatives nearby
1b	Keep in touch with friends and relatives far away
2	Invite good friends
3	Share bad news
4	Make an appointment for leisure activities
5	Give emotional support
6	Share good news
7	Congratulations
8	Feel like chatting
9	Send a practical message

In each 2½-hour session the participants discussed the nine communication scenarios. The moderator asked for equivalent personal experiences, kept the participants focused on their preferences for particular communication methods in a particular situation, and asked for their motivation. The order of scenarios differed per group, partly determined by the flow of the conversation. If a particular scenario in the booklet spontaneously came up during the discussion, the moderator was allowed to address that scenario next. Each session was recorded on audio tape.

### **4.2.3 Data analysis**

Professional transcribers transcribed the sessions verbatim into typed text. The transcripts contained the participants' comments about using communication methods in different communication contexts. Quotes containing a *motivation* for applying *a method of communication* in a particular *scenario* were selected for further analysis. General motivations for using a communication method, that is, not specifically addressing a scenario, were also selected.

Two coders analyzed each transcript independently according to a coding scheme. This scheme consisted of different *dimensions* and *categories*, based

on both the data and the research question. Comments on methods of communication were coded according to three dimensions: (A) the medium or method (e.g., telephone), (B) the communication context according to the scenarios in the booklet, supplemented with a category 'non-specific scenario' for general comments on a medium, and (C) motivation or consideration for using this method in this situation. Dimension C included the judgment categories benefit, cost, less or no cost, and lack of benefit. *Benefit* was defined as an advantage, or positive statement about using a method, for example "it is personal", "you get an immediate response", or "it has a certain anonymity, I like that". *Cost* was defined as a disadvantage, or negative statement, for example "it is pretty cold", "you're uncertain if they received the message", or "it is slow". *Less or no cost* was a negatively stated comment about a disadvantage, or cost, for example "it is not so expensive", or "it doesn't interrupt me". Cost and less or no cost did not necessarily involve financial aspects. *Lack of benefit* was a negatively stated comment about an advantage, or benefit, for example "for me it's not useful", or "e-mail is not so warm". The other categories in C were *availability* (whether the method was available for one's communication), *habit* (being accustomed to using this method) and *skill* (being able to handle the equipment). There was also a category for *other comments*.

## 4.3 Results

### 4.3.1 General description and data reduction

The 18 focus group sessions yielded 2,996 quotes in total about using media in different communication contexts: 857 from American e-mail users, 1,025 from American non-e-mail users, 472 from Dutch e-mail users, and 642 from Dutch non-e-mail users. These quotes, containing media judgments, were coded according to the three dimensions A, B, and C, with inter-rater reliabilities of 98%, 89%, and 82%, respectively, for the American sessions, and 99%, 83% and 76% for the Dutch sessions.

The data coded according to dimension C were reduced to the judgment categories benefit, cost, less cost, lack of benefit, and 'other'. Most of the comments on availability (5% of the total comments) addressed the *unavailability* of a communication method, especially e-mail. In these cases, persons in the participant's social environment did not have e-mail, so that e-mail could hardly contribute to the participant's communications. These comments on availability

were therefore assigned to the lack of benefit. Comments on skill (3% of the total) reflected negative statements about handling equipment, and were assigned to the cost category. The small habit category (2%) was classed under 'other' (21%), wherein approximately three quarters of the comments expressed personal or social norms, such as "You'd better not drop in unannounced", or "It is inappropriate to make a phone call in a church". Finally, a modest reduction was applied to dimension A, communication methods: the category 'fax and other methods' was not included in the analyses, because this category was diverse and small (7%).

The statistical analyses were performed on quotes addressing the judgment categories benefit, cost, less cost, and lack of benefit, and the communication methods telephone, e-mail, cellular phone (also mobile phone or GSM, referred to in the remainder of the chapter as cell phone), visit, and regular mail. They applied to all of the scenarios coded according to dimension B. This selection comprised 2076 quotes, which was 69% of the coded material.

#### ***4.3.2 Sample homogeneity for judgment categories***

Table 4.3 shows the relative sizes of the four judgment categories benefit, cost, less cost and lack of benefit in the four participant sub-samples according to e-mail use and nationality. The last column represents the sum of the absolute numbers of the four judgment categories.

Adding up positive statements (that is, benefit and less cost) and negative statements (cost and lack of benefit), respectively, shows a balanced representation of positive and negative statements; they each accounted for 50% of the statements. This means that the focus groups were unbiased with respect to positive and negative comments. This was true for each sub-sample ( $SD = 3.4\%$ , approximately, per statement type).

The bottom row indicates the unequal representation of the four judgment categories in the total sample. Of all judgment categories, benefit was the largest (42%), before cost (27%) and lack of benefit (23%). The less cost category was relatively small (8%). This hierarchy of category sizes (benefit, cost, lack of benefit, and less cost) also applied to each of the participant sub-samples. Although the American e-mail users mentioned slightly more benefit than did other participants ( $\chi^2 [3] = 10.75, p < .01$ , *expected values* according to the judgment pattern in the total sample), the general hierarchy of the four category sizes was also maintained in this sub-sample.

Table 4.3

*Sizes (%) of judgment categories per participant sub-sample*

Participant sub-sample	Judgment category (%)				100% (no.)
	Benefit	Cost	Less cost	Lack of benefit	
NL e-mail	41	28	10	21	362
NL no e-mail	38	31	10	21	474
USA e-mail	* 48	25	6	21	562
USA no e-mail	39	28	7	27	678
Total sample	42	27	8	23	2076

\* |residual  $\chi^2$ | > 2**4.3.3 Judgments per communication method**

Having established the baseline for judgment categories in the sample in Table 4.3, we next examine the relative sizes of the four judgment categories per communication method. Whereas the hierarchy of category sizes did not vary between the participant sub-samples, differences were found between media (Table 4.4). The general order of category sizes (benefit, cost, lack of benefit, less cost) was most clearly violated in the assessment of e-mail, where lack of benefit instead of benefit was the largest category.

Table 4.4

*Judgment category sizes per communication method*

Communication method	Judgment category (%)				100% (no.)
	Benefit	Cost	Less cost	Lack of benefit	
Telephone	* 49	* 23	* 11	* 17	729
E-mail	** 29	29	* 5	** 37	696
Cell phone	42	24	7	27	165
Visit	48	* 40	7	** 5	234
Regular mail	48	30	8	* 14	252
Total media	42	27	8	23	2076

\* |residual  $\chi^2$ | > 2 \*\* |residual  $\chi^2$ | > 5

A Chi-square test of homogeneity for all media was significant ( $\chi^2 [12] = 187.96, p < .000$ , *expected values* according to the 'total media' proportions, see bottom row). The residuals of this test indicated e-mail and telephone as major contributors to the large statistical effect. For e-mail the number of mentioned benefits was significantly smaller than for other media, whereas the lack of benefit category was significantly larger. Telephone showed the reverse: it yielded significantly more benefit judgments and significantly fewer lack of benefit judgments than did 'total media'. Furthermore, less cost was mentioned more often for telephone, which contrasted with the relatively small less cost category in e-mail. The category visit also showed two inconsistencies with the general pattern: the number of costs was larger than in other media, but lack of benefit was hardly mentioned.

In addition, the sums of positive (benefit and less cost) and negative (cost and lack of benefit) judgments show that e-mail in particular yielded more negative than positive judgments per se (66% and 34 %, respectively). Telephone shows the reverse effect (40% negative and 60% positive). The amounts of positive and negative judgments about the other media were more balanced.

The results shown in Table 4.4 gave rise to further analysis of the judgments, particularly on telephone, e-mail, and visit; they deviated from the standard pattern, but in different ways. Table 4.5 shows the category sizes for these media per participant sub-sample, according to e-mail use (users and non-users, regardless of nationality) and nationality (Dutch and American, regardless of e-mail use).

Chi-square tests of homogeneity were performed for each of the three media separately, to examine whether the category sizes in participant sub-samples deviated from the three respective judgment patterns in the total sample.

Participant sub-samples did not judge the telephone significantly differently from the total sample ( $\chi^2 [3] = 5.69$  and  $5.98$  for e-mail use and nationality, respectively, *ns*). The same applied to the assessment of e-mail by Dutch versus American participants ( $\chi^2 [3] = 3.62$ , *ns*) and the assessment of visit by e-mail users versus non-users ( $\chi^2 [3] = 0.83$ , *ns*).

In contrast, e-mail users and non-users judged e-mail very differently. As is shown in Table 4.4, e-mail yielded generally less benefit judgments than did other media. It also yielded more lack of benefit judgments. The residuals of the Chi-square test for e-mail in Table 4.5 indicate that non-users in particular perceived a considerable lack of benefit, and at the same time relatively little

benefit ( $\chi^2 [3] = 18.61, p < .01$ ). In this group the order of category sizes was clearly lack of benefit, cost, benefit, less cost. E-mail users, however, showed a different pattern: they perceived approximately the same number of benefits as lack of benefits. Compared to the total sample pattern for e-mail, their benefit category was relatively large and their lack of benefit category relatively small.

The assessment of visit showed differences between Dutch and American participants, though these were not particularly in the large cost category (see Table 4.4), but in the benefit and the less cost categories. The Dutch mentioned significantly fewer benefits, and the Americans significantly more benefits than was expected for the total sample. The reverse was shown for less cost.

Table 4.5

*Judgment category sizes for telephone, e-mail and visit, in participant sub-samples according to e-mail use and nationality*

Sub-sample		Judgment category (%)				100% (no.)
		Benefit	Cost	Less cost	Lack of benefit	
E-mail users total		53	23	9	15	319
Non-users total		46	22	12	20	410
Telephone	Dutch total	43	26	12	18	274
	American total	52	20	10	18	455
	Total sample	49	23	11	18	729
E-mail users total		** 35	27	6	* 32	365
Non-users total		** 22	32	4	* 42	331
E-mail	Dutch total	30	28	7	35	246
	American total	28	30	4	38	450
	Total sample	29	29	5	37	696
E-mail users total		50	40	5	5	96
Non-users total		47	41	8	4	138
Visit	Dutch total	* 39	46	* 11	4	122
	American total	* 58	34	* 3	5	112
	Total sample	48	40	7	5	234

\* = |Residual| > 1.5, \*\* = |Residual| > 2

#### ***4.3.4 Media judgments related to communication scenarios***

The comments on a communication method were usually spread over the different scenarios discussed in the focus groups. However, some scenarios yielded more comments about a medium than others. This indicates that the participants associated using a medium with specific scenarios.

The communication methods telephone, e-mail, and visit were selected for an analysis of scenario-related judgment. Telephone and e-mail represent long-distance communications as opposed to face to face contact, e-mail represents written communication as opposed to communication by voice and face to face contact, and visit and telephone represent traditional methods as opposed to a new medium. For economy reasons cell phone and regular mail were not considered in this analysis. The numbers of cell phone comments per scenario were anyway very small.

For the telephone, scenarios yielding the most comments were keep in touch far away (scenario 1b; 19%), general comments (scenario 10; 12%), make an appointment (scenario 4; 11%), and give emotional support (scenario 5; 11%). Large scenarios for e-mail were general comments (scenario 10; 21%), keep in touch far away (scenario 1b; 20%), and make an appointment (scenario 4; 10%). Finally, typical visit scenarios were give emotional support (scenario 5; 29%), keep in touch nearby (scenario 1a; 19%), and share bad news (scenario 3; 13%).

Within the framework of this research the comparison of e-mail with traditional media was of particular interest. For this purpose, Table 4.6 shows the 'large' scenarios mentioned above that were both associated with e-mail and a traditional medium, which was the telephone in all cases. The results for subsamples are presented separately for American and Dutch participants judging telephone in scenario 1b, because they differed significantly from the total sample pattern ( $\chi^2 [3] = 7.94, p < .05$ ).

The telephone was considered to be beneficial for both keeping in touch over long distances (scenario 1b) and making appointments (scenario 4). The general comments category also yielded a substantial number of benefit judgments.

The verbatim focus group quotes referring to telephone benefits in scenario 1b suggest that intimacy and the personal touch were the main reasons for using the telephone in this situation, especially when a visit was not feasible. With regard to scenario 1b, the Americans judged the medium even more positively than the Dutch. Here, the verbatim quotes suggest that bridging the distance was a particularly important consideration for the Americans. For making

Table 4.6

*Representation (%) of judgment categories for e-mail and telephone in selected scenarios*

Scenario and communication method	Judgment category (%)				100% (No.)	
	Benefit	Cost	Less cost	Lack of benefit		
1b Keeping in touch (far)						
<i>Telephone</i> *	Dutch	37	29	12	22	49
	American	57	24	11	8	88
	Total sample	50	26	12	13	137
<i>E-mail</i>		53	14	9	23	137
4 Making an appointment						
<i>Telephone</i>		58	22	13	7	78
<i>E-mail</i>		22	30	2	47	70
10 General comments						
<i>Telephone</i>		38	29	18	15	89
<i>E-mail</i>		21	52	8	19	148

\*  $p < .05$  (Dutch and American participants judged the medium differently)

appointments the main reason seemed to be the directness and interactivity of the communication, promoting an efficient dispatch. The telephone also yielded many general comments, not related to one of the scenarios. In general, the participants considered the telephone to be beneficial because it is easy to use and provides a relatively personal means of communication.

E-mail was judged positively for long distance contacts with relatives and friends (1b). According to the contents of the focus group quotes addressing e-mail benefits, bridging large distances and dealing with time zones (the Dutch for intercontinental contacts) were the main reasons. An additional, distance-related argument mentioned by e-mail users was strengthening their existing long distance communications: e-mail added to traditional methods such as the

telephone and a personal visit.

E-mail yielded many negative comments for making appointments. The focus group quotes revealed that e-mail was perceived as being particularly inefficient, as the recipient might not read the e-mail immediately (both formulated as cost and lack of benefit). Another argument in this respect was that many peers did not have e-mail.

Of all five media, e-mail yielded the most comments that were not related to a scenario. These general comments showed similar quantitative patterns of the four judgment categories for e-mail users and non-e-mail users. All participants, irrespective of e-mail experience, perceived relatively large e-mail costs.

However, costs perceived by participants not using e-mail concentrated on the lack of skills and were formulated in a very general way (for example: "learning to use the computer is too difficult for me"), whereas in participants with e-mail experience costs consisted of concrete barriers such as starting up the computer or having to go upstairs to use it. Financial aspects were rarely mentioned. On the benefit side, both e-mail users and non-users experienced or could imagine the convenience of electronic mail: "just one click to send a message". E-mail users mentioned diverse, but specific lack of benefits, such as missing intimacy and the uncertainty about the immediate receipt of the message, whereas non-users expressed their perceived lack of benefit by simply stating: "I don't need it".

#### **4.4 Discussion**

Systematic differences between media judgments regarding different scenarios show that the assessment of communication methods in this study were media-related, context-related, and experience-related. E-mail users and non-users demonstrated different judgment patterns especially for using e-mail, which was in line with the experience-related media judgments found in the study in chapter 3, and with earlier research showing that experience in using computers positively affects older adults' attitudes towards computers (Czaja & Sharit, 1998). The similarity between the judgments by both nationalities, in addition to the homogeneity of the results when media and contexts were not considered, also suggests that these results apply to an international (Western) older population of diverse ethnicity. High inter-rater reliabilities, even for the eight categories according to dimension C, indicate that the findings in this study can be replicated.

The most striking finding of this study was the lack of benefit concept. At first sight, the results presented in Table 4.3 suggest that it is first the benefits and then the costs that determine older adults' considerations regarding their media use; this was in accordance with the initial expectations. On the other hand, the judgments in the total sample comprised 50% positive statements and 50% negative statements about using media, suggesting a well-balanced weighing of pros and cons. However, the composition of these two statement types indicates the conceptual importance of benefits (their presence and absence) to understand both the participants' positive *and* negative statements.

A closer look at the positive statements reveals that they mainly consist of benefits and hardly any less cost judgments, whereas almost half of the negative statements were determined by lack of benefits in addition to costs. This relatively large portion of *absent* benefits in negative statements sheds a new light on what may simply seem to be costs. The composition of the joint positive and negative statements about individual media shown in Table 4.4 support the importance of this nuance.

First, we should notice that the proportions of negative and positive statements were different per medium, and were not necessarily fifty-fifty. They were most unequal for e-mail, yielding only 34% positive judgments (benefit or less cost). In contrast, of all the media, the telephone yielded the most positive judgments (60%). These outcomes are consistent with the outcomes of the study in chapter 3, indicating that experience with a medium affects its judgment: e-mail was relatively new for both users and non-users, which might explain a less positive overall judgment compared to other methods.

Within the negative statement type (the sum of cost and lack of benefit) it was particularly e-mail, but also cell phone, that yielded much of the lack of benefit judgments compared to the other media. The contrast between lack of benefits for e-mail and lack of benefits for other media is significant. The level of perceived costs for e-mail was not significantly higher, however. In addition, there were relatively few benefits to compensate for the lack of benefits and costs associated with e-mail. In contrast, the proportions of benefit judgments for telephone, visit and regular mail were considerable. In other words, the relatively large proportion of negative e-mail statements was mainly determined by the many lack of benefits, and the relatively few positive e-mail statements were mainly determined by the few benefits. This was not true for the other media. Interestingly, cost was not the major difference.

The results presented in Table 4.5 show that it was not only e-mail *non*-users, but also e-mail users who judged e-mail (slightly) more negatively than they judged other media. However, non-users account for most of the negative assessments of e-mail. Both observations are once again in line with the study in chapter 3: both non-users and users might be less familiar with e-mail than with other communication methods, non-users to a greater extent than users.

The deviating composition of the negative statement category and the positive statement category for e-mail when compared to other communication methods particularly applied to the e-mail *non*-users. The combination of fewer benefits present and more benefits absent distinguished e-mail from other communication methods *and* e-mail users from non-users, regarding the assessment of e-mail.

Interestingly, this contrast did not apply to the assessment of the telephone and the personal visit by e-mail users and non-users, or to the assessment of e-mail by American versus Dutch participants. This supports the idea that differences with respect to e-mail were medium-specific and also specifically related to e-mail use; the judgment patterns were not uniform for all media and all sub-samples.

So far, the discussion of media judgments has been addressing media judgments regardless of scenario. However, all media judgments in the focus groups were inherently context-related and also concrete. The concentration of media judgments in particular scenarios illustrates that using a method of communication was not only context-related, but also *context-specific* to some extent.

The participants recognized keeping in touch with relatives and close friends and giving emotional support as particularly important communication scenarios. This is consistent with the results from the first study; a common feature of these communications is the involvement of emotionally close relationships. Making an appointment was also discussed quite extensively, suggesting the importance of establishing face to face contacts. Other notable peaks were the numbers of general comments, particularly on e-mail. The relative unfamiliarity with the medium (of both users and non-users) might explain the large size of the general comments category for e-mail: it may be harder to discuss concrete applications of a relatively unknown medium, and participants may have less experience of using it in diverse situations.

The examination of verbatim quotes from the focus group transcripts reveals that two criteria in particular were important for judging both telephone and e-

mail with regards to intimate communications (such as scenario 1b, keep in touch over long distance): conveying intimacy, and bridging large distances.

In scenario 1b, the e-mail benefit category was exceptionally large compared to the e-mail benefit category in any other scenario, but it primarily addressed bridging the distance. The lack of benefit category for e-mail in this scenario mostly addressed intimacy. Intimacy is an important aspect of communications such as in scenario 1b, which may explain why e-mail was perceived as a contribution to the bridging-the-distance part of these communications and as an additional channel to existing media, but was in no way a qualitative replacement.

This also suggests an answer to the question at the beginning of this study, whether 'such a physically undemanding bridge is also capable of helping older adults to maintain their most valued relationships.' E-mail in its current form might promote these (intimate) contacts, provided that it adds to communicative channels with 'intimacy' qualities comparable to those of a personal visit or a telephone call.

In this respect, it might also be interesting to consider a study by Bikson and Bikson (2001). This study discussed the impact of Internet use on the communications between retirees and (older) employees in the context of a retirement program, and also addressed its potential added value to traditional media. Bikson and Bikson conclude that "far from replacing other media, electronic media add a new dimension to their usability by improving the efficiency of direct contacts..." Also, "...the frequency and spontaneity of interactions facilitate ... social exchange" (K. Bikson & T. Bikson, 2001, p. 145). Participants in this study did recognize these potential merits, but were also very critical. We could explain this by looking at the type of communications referred to in scenario 1b, which very probably require a higher degree of 'intimacy' than was required by the communications in the Bikson and Bikson experiment. Moreover, in the latter experiment participants had relatively easy access to electronic media, which is not (yet) the case in the current older population at large, or in the social networks of the focus group participants.

The relatively negative assessment of e-mail for making appointments (scenario 4) could be ascribed to a lack of communicative efficiency due to uncertainty and delay. The availability of a good traditional alternative with many benefits in this area (the telephone) seemed to make e-mail even less attractive to serve this goal.

Finally, the general media comments on e-mail suggest that the experience with a medium influence the way it is perceived. To begin with, both users and non-users of e-mail perceived many general costs. Both groups were relatively inexperienced in using e-mail compared to using other media, and were most likely also inexperienced in using a computer, which may explain this generally more negative judgment (e.g., Czaja & Sharit, 1998).

However, non-e-mail users mentioned many general costs but did not specify them, whereas e-mail users also mentioned many costs and concretely described them. The unspecified lack of benefits mentioned by non-e-mail users also contrasted with the more specific lack of benefits mentioned by e-mail users.

Although e-mail users perceived costs, they still were e-mail *users*. They showed that costs per se did not discourage them from using e-mail, in other words, these (known) costs seemed to be perceived as being 'reasonable'. Non-users might have misperceived or overestimated e-mail costs, thus raising the barriers that kept them from using it. This interpretation implies that, as far as perceived costs are concerned, leveling or lowering of potential barriers for e-mail users and non-users may need different approaches. For instance, users may perceive concrete costs and may want concrete support to overcome them, whereas for non-users, with a vague notion of the costs, a clarification of the costs may first be needed. However, we should still note that the total media judgments in this study showed that e-mail judged by non-users yielded a disproportional number of perceived *lack of benefits*, but not a disproportional number of *costs*.

This study cannot be decisive about the role of age, as it only comprised older adults. However, the study in chapter 1, as well as earlier gerontological research (see Chapter 1 for a literature review), indicate a specific age-related selectivity and parsimony regarding the use of physical and mental resources in general (e.g., Baltes & Baltes, 1990; M. Baltes & Lang, 1997; Melenhorst, 2002) and the maintenance of social relationships in particular (e.g., Carstensen, 1991). It is likely that the adoption of new communication technology by older adults is also prone to this selectivity and parsimony.

To summarize, this focus group study indicated that perceived lack of benefits rather than perceived costs affected older adults' adoption of a relatively new communication method, in this case e-mail. User-experience also played a role: the strength of the lack of benefits was most obvious in non-users assessing e-mail, and did not apply to traditional media to the same extent. This underlines

the distinguishing relevance of lack of benefits for the adoption of new media. Although this study did not directly address the difference between older and younger adults, it at least indicated a 'lack of benefit' sensitivity rather than a 'cost' sensitivity of older adults, which might help us to understand their adoption and rejection of new technology.

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## Appendix

*These communication scenarios were printed on the separate pages of a 14 × 22 cm ('A5' or 'envelope C5') booklet. Font: Arial 14 points. Line spacing: 1.5.*

### Nine Communication Scenarios

#### 1.

You want to know how another person is doing, and keep in touch on a regular basis. You know this person very well, so you would like to have some frequent form of contact. At least once a month.

- You know each other very well, your relationship is close.
- You want to keep in touch on a regular basis.
- At least monthly.

#### 2.

You would like to invite close friends or relatives for a long weekend at your place, sometime next month. You want to make sure that they will be able to come. They live pretty far away.

- Close friends or relatives.
- Purpose: invite them to your place.
- Make sure that they can come.
- They live pretty far away [1/2 day traveling].

#### 3.

Unfortunately, you have bad news for somebody in your social group. For example an accident happened to somebody you both know well, or a common friend is very ill.

- You have to bring bad news.
- The message concerns you as well as the person you contact.

#### 4.

You need to set a time for a leisure activity with somebody else. For example to play tennis this week, or dominos, or bridge, or to decide about the time for next week's meeting with the walking club.

- Friends.
- Set a date for a leisure activity.

**5.**

A very close relative or friend is having a hard time. For example, he or she is very ill, is depressed, or just got divorced. You want to give emotional support. This means a high contact frequency, you want to have contact at least once a week.

- You know each other very well.
- You want to emotionally support the other person.
- Contact frequency is high: at least weekly.

**6.**

You're happy or lucky and you want to share it with other people. You cannot wait! You want to shout it from the rooftops! For example, you became a granddad/ grandma, or you won \$50,000 in the lottery.

- Share something (positive event).
- With more than one person.
- Immediately, if possible.

**7.**

You want to congratulate one of your friends on his or her birthday, or another special occasion. The special occasion means that the specific moment is important.

- One of your friends.
- Congratulations!
- Timing of the message is important.

**8.**

You just feel like some chat or contact with another person. It doesn't matter exactly who.

- Conversation, personal contact.
- No specific person in mind.

**9.**

You want to pass a small *practical* message to an acquaintance or, for example, somebody you met at a birthday party. You promised a recipe, the name of a nice restaurant, or the title of a book. It is not really important, just nice.

- Someone you don't know very well.
- Practical message.
- Not really important, you just want to be nice.



# 5

## Postponement perceived as a factor of uncertainty\*

### 5.1 Introduction

This chapter examines the perceived value of desirable objects, outcomes and rewards for which the obtainment is postponed. For example, how attractive is the promise of easy e-mail communication when it is to be realized in the future? Deciding to take a computer course now to enjoy the benefits of e-mail later involves an implicit dilemma: how long would it take to master the skill, how much effort is needed, and would this investment of time and effort pay off in the future? The basic question in this study is how older adults deal with such dilemmas and whether they do so differently from younger adults.

The studies in the previous chapters indicate that the adoption of something new, whether it is a new person in one's social circle, the acquisition of a new skill, or a new communication means for everyday use, involves the weighing up of pros and cons, of benefits and costs. Benefits in particular appeared to weigh heavily. It is very probable that both young and old individuals apply 'cost-benefit' principles, however, the previous chapters have shown that the considerations for determining the weight of costs and benefits may differ between individuals in general, and between individuals of different ages in particular.

First, the *content* of what is perceived as a benefit, that is, the actual meaning of benefit, may change with age. The study in chapter two demonstrated such an age-related change of benefits in the social domain. It showed that benefits

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\* This chapter is a slightly modified version of Melenhorst, A.S. (2002).

of social relationships are increasingly thought of in terms of *emotional closeness* when people get older. The studies in chapters three and four indicate that the meaning of benefits of communication methods depends on the requirements of the concrete communicative situation and the goal. As a consequence of age-related change in social preference, communication priorities and goals may also change with age, and with them changes the perception of what a communicative benefit actually means.

However, the attractiveness of the 'object' of interest, which can be broadly defined as either a social relationship, mastery of a skill, or the use of a new medium, seem not only to depend on the perception of its benefit per se. The *likelihood* of its obtainment (e.g., as was expressed in study 3, "will I be able to learn how to use the computer?") and the likelihood of enjoying the expected benefit (e.g., "I'm not sure if I would enjoy sending e-mails"), also seem to be factors in determining the objects' attractiveness. In other words, to be attractive, an object and its qualities should not only be perceived as beneficial, but also as attainable and enjoyable.

Again, this seems to be a 'common sense' principle, applying to both older and younger individuals. However, older adults may have a different perception of 'attainability' and 'enjoyability' than younger adults do, especially when it concerns future objects.

Earlier gerontological research, for example by Carstensen and colleagues (e.g., Carstensen, 1992; Fung, Carstensen & Lutz, 1999), showed a present-oriented mentality in older individuals with respect to their social relationships. Socio-emotional selectivity, also demonstrated in chapter 2 of this dissertation, can be seen as one of the consequences of the age-related increase of present-orientedness, in that the qualities of long-standing close relationships carry no uncertainty and can be enjoyed immediately. The qualities of a new relationship are uncertain and, at least in terms of emotional closeness, may need some time to develop before they can be enjoyed.

Analogously, the benefits of an established medium such as the telephone are obvious to most people, whereas the benefits of e-mail, for example, are relatively unknown and uncertain to a large portion of the current older population. Moreover, learning to use a new medium and getting familiar with it involves time, which delays its actual benefit and enjoyment. In this way, the perception of 'delay' might also affect the perception of the benefits of Internet, for instance, and might therefore also be a factor of interest in understanding older

adults' preferences regarding new media.

In conclusion, how does a period of delay-time affect the perceived value of objects to be obtained in the future, provided that these objects as such are desirable, and how does this possible impact of delay relate to the age of the decision-maker? For example, do people become increasingly intolerant to postponement when they age, as would be expected in view of earlier gerontological research, or are they actually more patient, which is another widespread belief?

The devaluating impact of delay is also called *time or temporal discounting*. The phenomenon has been studied extensively in classical decision-making theory (e.g. Ainsly, 1992; Chapman, 1998; Loewenstein & Prelec, 1991). This research shows that a postponement, or *delay*, reduces the perceived value of objects, outcomes and rewards. It is generally assumed that temporal discounting applies to everyone, irrespective of age. One explanation for the phenomenon is simply *impatience*; people do not like waiting. Another explanation is that delay implies an inherent *uncertainty*, involving the risk that the delayed reward will not be obtained (see Keren and Roelofsma, 1995, for example).

Only three studies have addressed the role of age in decision making over time (Green, Fry, & Myerson, 1994; Green, Myerson, Lichtman, Rosen, & Fry, 1996; Green, Myerson, & Ostraszewski, 1999). Green and colleagues (1996) found no significant difference between younger and older people, whereas in another of the three studies (Green et al., 1994) a *lower* temporal discounting was found in older people. From the reanalysis of these studies (Green et al., 1999) the authors finally concluded that there was a lower degree of temporal discounting in older individuals than in younger individuals. In the 1994 study they explained this result as 'a developmental trend toward increased self-control' (Green et al, 1994, p. 33), which refers to the 'impatience' argument.

From these studies we can conclude that older people are more *long-term oriented* than younger people, which does not correspond with gerontological observations and research indicating an increasing *present-orientedness*. It is possible that the relevance of self-control versus dealing with uncertainty, for example, is different for decisions about different kinds of delayed rewards. Moreover, the identification with the 'desirable future object' might affect the decision-making as well, and might also partly explain the results in the experiments of Green and colleagues, which seem to be inconsistent with other gerontological studies (e.g., Carstensen, 1992; Fung et al. 1999).

In the temporal discounting experiments of Green and colleagues the stimulus material consisted of hypothetical amounts of money, the obtainment of which was postponed. For example, participants aged between 65 and 70 were asked to choose between '\$100 now' and '\$10,000 in 25 years'. Interestingly, many of these older adults chose the higher amount in 25 years. Considering that they would then have been over 90, the actual identification with the topic seems questionable, which might have influenced the decision-making in the experiment, and might have ruled out considerations such as the uncertainty of attainment and enjoyment. In addition, the amounts were presented in a sequence in which they gradually increased, or decreased, and each participant was presented with 960 pairs of amounts in total, which might not have encouraged the conscious consideration of the consequences per individual decision.

To summarize, it seems that in the case of purely 'rational' decisions promoted by the stimulus type, the number of stimuli, and their presentation, for example, fewer personal considerations are involved than in the case of decisions being concrete reminders of the participant's personal situation. The latter is of particular interest in our current research.

Gerontological research indicates that the devaluating impact of time via perceived delay-inherent 'uncertainty' might be of greater importance for longer-term decisions in later life than the moderating effect of 'increased self-control'. Aging is inversely related to both the amount of remaining chronological time and the amount of remaining 'quality time' in one's life. Declining health is a particular age-related threat to the quality of life, and might also indicate one's position in the lifecycle. Future time in later life, therefore, implies uncertainty in the first place.

Consequently, and in contrast with the studies of Green and colleagues, the study presented in this chapter started with the following hypothesis: Postponement reduces the values of events, purchases, and activities *more strongly* in the perception of older adults than in the perception of younger adults.

The experiment was an adapted version of traditional temporal discounting experiments (see the method section for the description). To promote the identification with the 'future object' and to make people consider their personal circumstances, the stimulus material consisted of postponed *holidays* instead of amounts of money. It was assumed that a (freely obtainable and self-selected) holiday in itself was a desirable object. The presentation of stimulus pairs was random and their number was reduced to only ten.

To examine age differences, participants with similar demographic characteristics in two age ranges were selected. Middle-aged instead of very young individuals represented the younger group, in order to reduce the interference of 'practical' considerations such as parenthood in the near future. In addition, none of the middle-aged participants had small children, to make the older and the 'younger' age groups more alike with regards restrictions on the realization of travel plans.

## 5.2 Method

### 5.2.1 Participants

The participants in this study were 24 independently living adults from the Eindhoven area of the Netherlands, selected from a research volunteer pool. Twelve were in the age range 40 to 45 (six men and six women;  $M = 42.3$ ,  $SD = 1.2$ ) and 12 were in the age range 70 to 75 (six men and six women;  $M = 71.4$ ,  $SD = 1.8$ ). All participants had four years of High School education and an additional professional education (or a comparable education), with the exception of two participants in both age groups with a Bachelors or a Masters degree. Nine of the middle-aged participants and ten of the older participants owned a car. Traveling experience was measured according to verbal reports. Seven middle-aged participants and six older participants considered themselves to be experienced travelers. In the older group nine participants reported that they or their spouses suffered 'poor health', limiting their freedom of movement. In the middle-aged group four participants reported such limitations (the correlation of health limitations and age was  $r_{\phi} = 0.40$  in this sample). Three participants lived alone in each of the groups. None of the middle-aged participants had children younger than ten years old. See Table 5.1 for an overview. Another five participants volunteered in a pilot study: one woman and one man in the age range 40 to 45, and two women and one man in the age range 70 to 75.

Table 5.1  
*Participant characteristics per age sample*

		age sample	
		40-45 years (N= 12)	70-75 years (N= 12)
gender	male	6	6
	female	6	6
level of education	higher	2	2
	middle	10	10
car possession	own a car	9	10
	do not own a car	3	2
traveling experience	experienced	7	6
	inexperienced	5	6
marital status	live alone	3	3
	live with a partner	9	9
health limitations	limitations	4	9
	no serious limitations	8	3

### 5.2.2 *The temporal discounting paradigm*

The participants in traditional temporal discounting experiments (e.g., Green et al, 1994; 1996) were placed in dilemmas involving the postponed receipt of monetary rewards. For example, they were asked, successively, whether they preferred the receipt of

\$500 now      or      \$ 1000 in 6 months  
 \$500 now      or      \$ 1000 in 1 year  
 \$500 now      or      \$ 1000 in 3 years  
 et cetera.

In this example, the delay time imposed on the higher amount increases. Whereas people tend to prefer the higher amount in the first dilemma, they may have doubts when this amount is delayed by one year, and may even prefer the smaller amount if the higher amount is delayed by three years. This shows that the perceived value of the higher amount drops when its obtainment is increasingly delayed (there was correction for currency inflation), which is consistent with the principle of temporal discounting.

In our current experiment, which was based on the principle in the example, the participants were also asked to choose between pairs of delayed rewards. However, these rewards were *holidays* instead of amounts of money.

### 5.2.3 Procedure

#### *Definition of items and pairs*

An *item* in this study comprised a holiday combined with a delay time. An item was defined as a hypothetical, free holiday to a specific destination to be spent after a specified delay. A *pair* comprised two different items. The items and pairs were determined individually per participant.

First, the participants were asked to define their own holidays by mentioning two personally appreciated holiday destinations. There were no further restrictions, provided that the one destination was preferred over the other (analogous to the high and the low amount of money in the example above). This free choice of the non-delayed holidays was an attempt to equate the initial appreciation values between participants, in particular the appreciation *difference* between the favorite and the second best holiday. Whereas a journey to China might represent the 'favorite holiday' for one participant, another participant might rather go to Belgium or Disneyland. Likewise, the 'second best' holiday was expected to show variation between individuals. Moreover, the size of the 'second best' holiday (e.g., expense and distance) might be consistently smaller than the size of the favorite holiday. In this way, the appreciation difference between the two holidays was also assumed to be more equal between participants than if the items were the same for everyone.

To avoid bothering the participants with redundant questions, their individual *delay ranges* were estimated before the actual experiment. A pre-test was designed to indicate the maximum and minimum delay time that the participant would accept. Postponing a holiday far beyond the indicated maximum would not yield meaningful answers in the experiment. That is, it does not make sense to ask if someone would like to go to China in ten years when a postponement of six years was already indicated as 'too long'. In addition, postponements that were too short would yield trivial answers: below a certain delay time the favorite holiday would be preferred anyway.

A pilot study among three older and two middle-aged individuals showed that the acceptance of delay differed between individuals. The pilot suggested three ranges of delay times: (A) delay times smaller than two years, (B) delay

times from two up to six years, and (C) delay times from six to ten years and more.

A pre-test was based on the three delay ranges found in the pilot study and divided the sample into three *temporal discount groups*. The pre-test procedure was as follows: (1) The participant was asked to choose between the (personal) favorite destination delayed by two years, and the 'second best' destination delayed by only five months. Preference for the 'second best' destination indicated little delay tolerance. These participants were assigned to group A. (2) Those selecting their favorite holidays postponed by two years were asked to postpone it by six years, and to decide again. Participants still preferring this favorite destination in spite of the delay belonged to group C. The others were assigned to group B. The initial estimations of delay ranges in the pilot study appeared to be satisfactory; each participant fitted in one of the established delay ranges, and thus could be assigned unambiguously to one of the three temporal discount groups.

A delay range comprised five delay times. Table 5.2 shows the three ranges and the corresponding delay times, expressed in months. The smallest delays, *one week* (I) and *five months* (II), were part of each range. These short delay times were necessary to postpone second-best holidays to a reasonable extent: relatively 'small' rewards allow less delay, according to the 'magnitude effect' (see, e.g., Chapman, 1998, p. 88). The maximum delay of a temporal discount group served as the intermediate delay in the next temporal discount group, to create an overlap between the discount groups (Table 5.2). During the experiment only the five-month delay was presented in terms of 'months'. The smallest delay was presented as 'a week'. Delays of 12 months and longer were presented as 'years'.

Table 5.2

*Delay times per range for participants in the respective temporal discount groups A, B, and C*

Group	Range (years)	Delays (months)				
		I	II	III	IV	V
A	0 to 2	0.25	5	12	18	24
B	2 to 6	0.25	5	24	48	72
C	6 to 10	0.25	5	72	96	120

Knowing the participant's holidays and the suitable set of delays, the items for the experiment could be constructed. These items were the combinations of the two holiday destinations and the five delay times from the appropriate range in Table 5.2. Two holidays multiplied by five delays gives ten delayed holidays, leading to  $10 \times 10 = 100$  possible pair-wise comparisons of delayed holidays. However, many of these comparisons did not represent a *dilemma*. These comparisons comprised identical pairs (10), one holiday destination with different delays (40), two different holiday destinations with the same delay (10), or the 'second best' holiday delayed to a greater extent than the favorite holiday (20). The 20 items remaining each occurred twice, so that 10 different dilemmas were eventually presented in the pair-wise comparison task.

Table 5.3 shows the composition of presented pairs per participant in terms of their favorite (H1) and their 'second best' (H2) holidays, and the respective delays (I-V) imposed on these holidays. These delays correspond to the delay times presented in Table 5.2.

Table 5.3

*Presented pairs of favorite (H1) and second best (H2) delayed holidays. Delays correspond to the delays in Table 5.2*

Delay of H2	Delay of H1				
	I	II	III	IV	V
I		×	×	×	×
II			×	×	×
III				×	×
IV					×
V					

### ***The task***

In the experiment the ten pairs were presented in a random order. The pairs, consisting of holidays and delay times relevant for the participant, were written down and read aloud, giving ample opportunity for the participant to consider the answer. For example, the comparison of (H2, II) with (H1, IV) for one participant in delay range C was: "What would you prefer, *10 days to the nearest seaside resort available after 5 months from now*, or *7 weeks to China available after 8 years from now*?" In each case the participants were asked to motivate their choices verbally.

In a brief interview after the assignment the participants were asked to indicate their own physical health and their spouse's health (if applicable). They were also asked whether they were subject to physical limitations in demanding activities such as traveling. The total sample was split into two health groups based on these verbal reports. The 'healthy' group reported 'reasonable', 'good' or 'excellent' physical health both for themselves and their spouses, and did not experience serious physical limitations. Participants in the 'unhealthy' group felt physically restricted due to their own health, their partner's health, or both. Education, car ownership, traveling experience, and marital status were also registered. See Table 5.1 for the figures.

## 5.3 Results

### 5.3.1 *Temporal discounting analyses and results*

The pre-test assigned participants to the three temporal discount groups. There were thirteen participants in group A, accepting a maximum of two years of delay time. Group B consisted of four participants, accepting two to six years. Seven participants were in group C and were prepared to accept delays of six years and longer.

The analysis of the data comprised three steps to determine per temporal discount group (1) the *appreciation values* of delayed holidays (2) the course of these appreciation values *as a function of delay time*, and (3) the relationship of these functions with *age* and *health status*.

#### *Step 1: determining the appreciation values*

Luce's choice model provided a suitable scaling method to transform the outcomes of the pair-wise comparisons for each discount group into *scale values*, expressing the relative, appreciation values of the delayed holidays (Luce, 1957; also see Torgerson, 1958). In the literature, the notations of temporal discount functions can often be recognized as variants of the logistic function (e.g., Green et al. 1994; Rachlin & Raineri, 1992). Accordingly, the Luce model expresses the participant's judgements as the *logits* of choice probabilities. Note that appreciation values according to this model are at interval level; the appreciation value *zero* does not mean 'worthless', but just another value on the scale (which also applies to the values in Figure 5.1).

The *goodness of fit* of Luce's model, expressed as proportions of explained variance, were 0.94, 0.96, and 0.97 for groups A, B, and C, respectively, and

show that the model describes the data of each of the respective groups very well.

**Step 2: describing the scale values as a function of delay**

In order to investigate the effect of delay on appreciation value, the scale values of the favorite holidays and the 'second best' holidays, as obtained from Luce's model, were expressed as a function of delay time for the temporal discount groups A, B, and C separately. The slope of the function indicates the degree of temporal discounting for favorite and 'second best' holidays demonstrated by the participants in each of these groups.

A linear function applying to each of the discount groups and to both favorite and 'second best' holidays can be described as  $V = v(0) + k D$ . In this function,  $V$  is the appreciation value of the holiday when it is delayed,  $v(0)$  is the initial appreciation value of the holiday, that is, when it is not delayed, and  $D$  is the delay-time in months. Finally,  $k$  is the discount factor, which is expected to vary between the groups; higher negative values of  $k$ , corresponding to a steeper slope, indicate a stronger negative impact of Delay on the Value of the holiday, meaning a stronger temporal discounting. Slopes ( $k$ ) and fits ( $r^2$ ) of the regression lines are presented in Table 5.4 per temporal discount group for both holiday types.

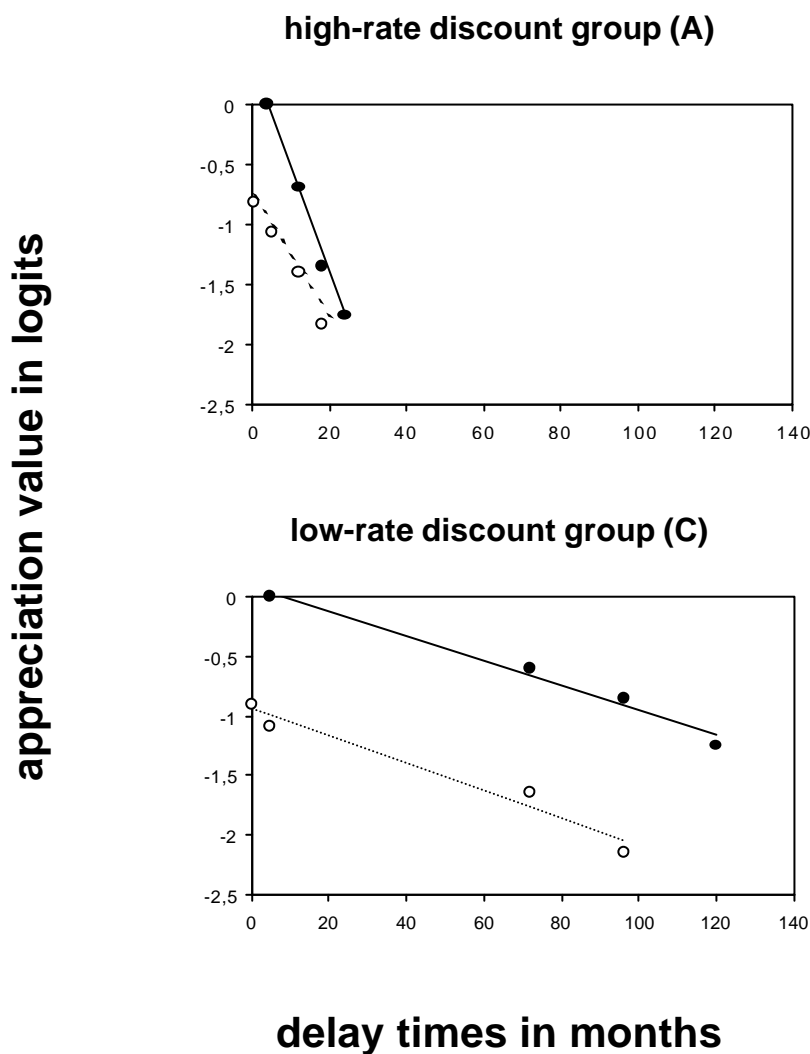
Table 5.4  
*Temporal discount rates (k) and fits (r<sup>2</sup>) for favorite and second best holidays (H1 and H2, respectively) per temporal discount group*

	temporal discount group and holiday type					
	A (N=13)		B (N=4)		C (N=7)	
	H1	H2	H1	H2	H1	H2
k	-.0944	-.0618	-.0216	+.0012	-.0105	-.0115
r <sup>2</sup>	.993	.928	.926	.249	.852	.965

Group B was excluded from further analyses because it yielded unstable results for 'second best' holidays (H2) and consisted of only four participants. Group A and group C demonstrated the extreme discount behaviors in the sample. Figure 5.1 shows the discount functions of favorite and second best holidays for group A and group C, from now on indicated as the 'high-rate

discount group' and the 'low-rate discount group', respectively. The appreciation values of the holidays are presented as a function of delay.

The slopes of the discount functions for favorite holidays in the high-rate discount groups and the low-rate discount group were significantly different ( $t(6) = -5.35, p < .01$ ). The same applied to the slopes of second best holidays ( $t(6) = -2.70, p < .05$ ). Within the discount groups the differences between the slopes of favorite and second-best holidays were not significant.



*Figure 5.1:* Temporal discount functions of favorite (●) and second best (○) holidays (full and dotted lines, respectively) for the high-rate and the low-rate discount group. The bullets are the observed appreciation values. Appreciation values are numbers at interval level, expressed in *logits*.

**Step 3: identifying participants per discount group**

Participants were assigned to temporal discount groups based on their temporal discounting *behavior*. To investigate whether this behavior relates to *age* and *health limitations*, the numbers of middle-aged and older participants with and without health limitations were determined for the high-rate and the low-rate discount group. Table 5.5 shows these numbers.

Table 5.5

*Numbers of middle-aged and older participants in the high-rate and low-rate discount group, with and without health limitations*

participants sub samples	temporal discount groups		total
	high-rate (A)	low-rate (C)	
total 40-45 years	4	7	11
health limitations	3	1	4
no serious limitations	1	6	7
total 70-75 years	9	0	9
health limitations	6	0	6
no serious limitations	3	0	3
total both age groups	13	7	20

Older participants were more often part of the high-rate discount group than were middle-aged participants, whereas the reverse was shown for the low-rate discount group (this group comprised no older individuals). The *Fisher Exact* probability test gives  $p < .005$ . In addition, people reporting health limitations were more likely to show a high degree of temporal discounting ( $p < .02$ ).

Within the ten participants who did not report health limitations, the age-difference in temporal discounting remained; more old than middle-aged participants within this group were in the high-rate discount group, and more middle-aged than old participants were in the low-rate discount group ( $p < .03$ ). In contrast, no age difference was found in those who *did* report limitations. In this group, both older and middle-aged participants were likely to be in the high-rate discount group (the *Fisher Exact* probability test gives  $p < .4$ ; *ns*).

### 5.3.2 Additional results

#### *Appreciation values of non-delayed holidays*

The specific, individual holiday destinations in this study were differed per participant. However, the differences between the initial *appreciation values* of favorite and 'second best' holidays were approximately the same for all participants. This is indicated by the estimated appreciation values on the y-axes in Figure 5.1. These values differed to the same extent for each discount group, which was not an artifact of the scaling method. The favorite and 'second best' holidays of the middle-rate discount group (not presented in Figure 5.1) showed a difference of approximately the same size (1.09, 0.96, and 1.08 in logits, for group A, B, and C, respectively).

#### *Holiday destinations in terms of traveling distance*

Table 5.6 shows the numbers of *intercontinental* (that is, non-European) and *continental* (Dutch or European) favorite destinations related to age and the report of health limitations for the participants in the high-rate and the low-rate discount group. Favorite holidays were usually further away than second-best holidays. Exceptions were the holidays of two participants twice mentioning a national (Dutch) destination.

Table 5.6

*Numbers of intercontinental and continental favorite destinations related to age and health limitations for participants in the high-rate and low-rate discount group*

participants sub samples	favorite holiday destination		total
	intercontinental	continental	
total 40-45 years	10	1	11
health limitations	4	0	4
no serious limitations	6	1	7
total 70-75 years	4	5	9
health limitations	3	3	6
no serious limitations	1	2	3
total both age groups	14	6	20

Older and middle-aged participants differed consistently regarding the traveling distance involved in their favorite holidays. The middle-aged participants more often chose an intercontinental holiday as favorite, whereas the older individuals also chose continental destinations ( $p < .05$ , *Fisher Exact* probability test). Participants with and without health limitations did not significantly differ in this respect, neither in the middle-aged group nor in the older group.

### ***Choice considerations***

The concluding interview and the comments during the pair-wise comparison task indicated that *delicate physical health*, irrespective of whether it concerned the participants' personal health or their spouse's health, was an important factor of constraint on planning future activities. Also widowhood as a consequence of disease was an indirect motivation for not postponing plans too much. Finally, a general motivation for choosing a simple holiday closer in time instead of a wonderful holiday in the future was "you never know what happens in the meantime".

## **5.4 Discussion**

Older adults in this study discounted future rewards to a higher degree than did middle-aged adults, as the numerical representations of both age groups in the high-rate discount group and the low rate discount group showed. These findings are consistent with the hypothesis and contradict the findings of Green et al. (1994; 1999).

### ***5.4.1 Methodological issues***

The discount functions found in this study had shapes similar to the functions reported in classical temporal discount studies, for example by Green and colleagues (1994) and Rachlin and Raineri (1992). The finding in classical studies that temporal discounting applies to people in general and is, as a phenomenon, not tied to age was also replicated in this study: temporal discounting was demonstrated by both middle-aged and older adults.

The very good fits of both the model and the discount function showed that Luce's model provided an appropriate method to scale the data, and that the regression lines described them very well as a function of delay-time. As the parameters of the Luce choice model (the appreciation values) were estimated by a linear least squares estimation, incomplete matrices such as those obtained in this study could be solved. This allowed the number of items per participant

to be reduced substantially, which appeared to be an advantage for the participants' identification with the topic; they weighed their decisions conscientiously and gave detailed motivations for their answers.

The free selection of holiday destinations in order to create an equal point of departure for all participants seemed to have been successful. The differences between the perceived appreciation values of favorite and second-best holidays were almost equal for all participants. In addition, there was a systematic difference between age groups regarding *concrete* preferences for favorite holidays in terms of traveling distance. This suggested that identical items for all might have led to discount rates not reflecting the discounting of actual aspirations or actual aspiration levels of the age groups, which would have affected the validity of the study.

A limitation of this study was the small number of participants. Considering the high values for goodness of fit, this small number did not affect the reliability of the study, however, to achieve a higher validity we recommend repeating the experiment with a larger sample. In addition, the age samples were similar regarding education, car ownership, traveling experience and living situation, enabling the comparison of age groups, but may not be representative of the total population. For example, the correlation between health and age might have been smaller in the present sample than in the population at large.

The method applied in this study seems to be an improvement on the traditional decision-making experiments, because it did not overburden the participants with stimuli and still yielded stable results. The small number of stimuli per participant could therefore be seen as a strength rather than as a limitation.

#### ***5.4.2 Postponement perceived as uncertainty***

Green and colleagues (1994; 1999) suggested that older adults are more patient and therefore show less temporal discounting than younger adults. Impatience, however, seems not to have played the major role in the participants' considerations when they decided about their future holidays in this study. All their comments referred to delay-inherent *uncertainty*, often explicitly related to health limitations. The relatively high number of participants with health restrictions in the high-rate discount group was therefore not surprising and also in accordance with the hypothesis.

Older participants related the uncertainty implied by postponement to their age. Their comments during the assignment were both of a general kind ("you

never know what will happen in the meantime") and specifically related to health risks "at my age". This could explain the high discount rate in older adults and their absolute reluctance to very long postponements regardless of concrete health limitations. Healthy middle-aged participants did not express such considerations. However, as soon as health limitations came into play, older and middle-aged individuals responded similarly, which was also reflected in their degrees of temporal discounting.

This finding is consistent with a study by Carstensen and Fredrickson (1998) in which younger HIV-infected adults demonstrated a degree of socio-emotional selectivity usually found in older adults. Their selectivity can be explained as an expression of present-orientedness and of aversion to postponement (refer to the introduction of chapter 2). In another study these authors showed that the anticipation of 'social endings', such as a planned emigration, have a similar effect (Fredrickson & Carstensen, 1990).

In conclusion, the findings in this study and in earlier gerontological research suggests a strong relationship between 'age' and the perception of delay-inherent uncertainty, affecting the appreciation of future objects. Moreover, this study indicates that anticipated endings are also a strong determinant of this perception.

Another finding of the study was a higher amount of intercontinental favorite destinations in the middle-aged than in the older adults. These choices most likely reflect the participants' current traveling aspirations, since the holidays were not yet delayed, and the participants did not know at the time about the exact content of the coming assignment. The initial preferences showed that the middle-aged participants had more ambitious traveling plans, in terms of distance, than the older participants, and that health limitations seem not to have been the deciding factor in this initial selection. This suggests that health limitations did not necessarily temper current traveling plans, but did temper the willingness to postpone them.

The physical condition of most participants and their spouses in this study, including those who reported limitations, was good enough not to prevent them from traveling now, but sometimes delicate enough to be an indicator of limited capabilities in the future. To summarize, it seems that (modest) health limitations triggered the awareness of delay-inherent uncertainty without necessarily affecting current ambitions.

The study cannot conclude whether the initial preferences of the older adults

were due to their age or to a cohort effect. For example, older adults might simply not feel like traveling far anymore, whereas they did when they were younger, or older adults might not have been brought up to travel in the way that individuals of younger generations were.

### 5.4.3 *Implications beyond holidays*

The question at the beginning of this chapter was how postponement would affect the value of desirable objects, outcomes, and rewards in older compared to younger adults. More specifically, the topic of interest was the impact of delay on the adoption of new communication methods by older individuals. To what extent could the holiday experiment give insight into the latter?

A critical conclusion from the experiment, in this respect, was the explicit conception of postponement as a source of *uncertainty*. This uncertainty appeared to be largely determined by the concrete circumstances of the participant as far as these were relevant for the attainment and enjoyment of a specific benefit. In the holiday experiment the delay-inherent uncertainty was explicitly represented by *health* risks as a threat to enjoying a future holiday. In addition, the older participants in particular felt delay-time per se to be a general source of uncertainty regarding the attainment and enjoyment of holidays.

So, what are delay-related uncertainties with respect to attaining and enjoying the communicative benefits from a new medium, particularly for older adults? Generally, delicate health could be perceived as a threat to one's remaining lifetime and, as such, to enjoying any future benefit. Also the passing of time as an uncertainty factor per se might apply. However, doubts about one's capabilities of mastering the skills required for using a medium might be an additional uncertainty factor, not caused by, but *causing* delay. This factor was not addressed in the holiday experiment.

Older individuals in particular usually need time and practice to learn to use new technical devices (e.g., Kelley & Charness, 1995) and this is also what many of them believe. For example, when starting a computer course they might feel uncertain about being able to master the skill and about the amount of time involved. As a consequence, they might expect much postponement and possibly abandonment of the desired result.

In conclusion, postponement per se might only partly explain the discounting of perceived communicative benefits. The role of postponement in the perceived attainability of future benefits also seems to be more complicated than could be revealed by the holiday experiment.

Yet, the holiday experiment had several merits. Firstly, it studied the phenomenon of temporal discounting in relation to age within a framework of longer-term decisions involving one's personal circumstances, and made it plausible that the *content* of the decision determines why and how delay affects the perceived value of future objects.

In line with this, the study indicated *uncertainty* instead of impatience as the main reason for temporal discounting in longer-term decisions, particularly by older adults.

Secondly, the experiment indicated the importance of perceived 'attainability' and 'enjoyability' to make attractive future benefits actually *desired*. This was illustrated by the selection of intercontinental holidays before the discounting assignment, for example, which was not affected by health limitations, whereas desiring them in the long term was.

Results in the previous chapters as well as earlier gerontological studies indicate that older adults tend to spend their energy in a selective way. These investigations suggest that one of their selection criteria is *perceived benefit*: older adults are generally prepared to overcome 'cost' (e.g., effort), provided that the corresponding 'benefit' is obvious to them. A second selection criterion, illustrated and supported by the current study, is the *attainment* of the benefit: older adults are prepared to overcome 'cost', provided that they perceive the 'benefit' not only as obvious and desirable, but also as attainable. This study indicates that, for several reasons, postponement is perceived as a risk making the attainment of desirable objects uncertain.

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# 6

## Conclusions

### 6.1 The decisive role of benefits

Are older individuals motivated to invest in using new communication technology? The research presented in this thesis suggests that they are, but not unconditionally. The four studies show older individuals' readiness to accept and overcome costs, provided that they clearly perceive the expected rewards as being beneficial. For the adoption of new media such as e-mail, the participants' perception of *benefits*, rather than their perception of *costs*, appears to be decisive.

#### 6.1.1 *Costs, benefits and the lack of benefits*

The benefit-side of the cost-benefit balance seems to be decisive for older adults' appreciation of new media, but in a slightly different way than was initially expected.

Chapter 4 showed that established and popular communication methods such as visiting and phoning were judged positively because of the many perceived benefits, although cost-awareness was definitely present. Even the perception of fairly high costs did not keep the older adults from applying and appreciating these methods. Neither could the costs account for the overall more *negative* evaluation of e-mail: the perception of costs was not responsible for the different appreciation of the established media and the relatively new e-mail, respectively.

Yet the appreciation difference between traditional communication methods and e-mail was found to be on the benefit-side of the balance. In addition to the relatively few benefits of e-mail, the *lack* of benefits was also explicitly mentioned. This applied to both the older individuals using and not using e-mail,

though to non-e-mail users to a greater extent. The study in chapter 4 also showed that e-mail judgments by e-mail users were specific, whereas judgments by non-e-mail users were non-specific. This indicates that the perception and judgment of e-mail by non-users might have been partly based on general prejudices, misconceptions, and lack of knowledge about the medium.

To summarize, the older adults' adoption of new communication technology was not only determined by the perception of benefits, but also by the perception of the lack of benefits. Costs were not found to be decisive, either in a positive or in a negative way. The explicit perception of *lack of benefit* seemed to be reason enough to reject a new technology, irrespective of perceived costs.

### **6.1.2 Desirability and attainability of benefits**

What makes a benefit a benefit? Firstly, it should be desirable. Secondly, it should be attainable. Chapters 2 and 5 in this thesis demonstrated the impact of these preconditions on older adults' perception of benefits.

The social preference of the older adults in chapter 2 indicates that they were prepared to overcome the costs involved in bridging distance, provided that the benefits, in this case the emotional closeness of the contact, were sufficiently large. The preference for emotionally close relationships seemed hardly affected by distance, whereas the preference for emotionally not close relationships was. This illustrates that the desirability of benefits could moderate the impact of inconvenient (but not insurmountable) costs, and, at the same time, that the costs of inconvenience gave rise to the selection of only the most desirable benefits.

Although distance perceived as a cost factor per se (that is, as spending precious resources, or as an inconvenience) did not seem to be a deciding factor for the social preferences shown in chapter 2, the participants still included 'distance' in their decisions. However, they interpreted distance as an *uncertainty* factor with respect to the obtainment of the desired reward. This seems to be a plausible explanation when we consider the participants' verbal motivations for social selectivity given in chapter 2, and the outcomes of the temporal discounting study in chapter 5.

Geographical distance and postponement were found to be uncertainty factors associated with delicate health and advanced age, leading to the discounting of physically demanding rewards. For older adults' adoption of new

technology the relevant barrier or cost may be the necessity of learning skills, the eventual acquisition of which is felt to be uncertain. This may lead to the 'discounting' of new technology. Moreover, the devaluating impact of postponement per se might play an additional role in older adults' reluctance to adopt new technology: they might expect to need a significant amount of time to learn the skills required.

The results described in chapter 4 indicate that the *desirability* of using a medium, expressed in terms of a perceived benefit or lack of benefit, was the decisive determinant of its attractiveness. However, considering the outcomes of the studies on social preference and on temporal discounting, it also seems important to better understand the perceived *unattainability* of a desirable benefit due to the cost. Cost should not only be understood as putting weight on the cost-benefit balance in terms of inconvenience and effort, but also as an uncertainty factor, affecting the perceived attainability of the benefit on the other side.

### ***6.1.3 Implications for the adoption of new technology***

What are the implications of this research for the adoption of new communication technology by older individuals? In terms of the cost-benefit balance, the potential user of a new medium should perceive the benefits of the medium as outweighing its costs. To establish this positive outcome, the *benefit side* of the balance is decisive.

Benefits should be perceived as obvious, sufficiently large, and in correspondence with one's communicative aspirations. This is true for both traditional and new media. The perception of *lack* of benefits, for example unclear or insufficient added value to the existing communication channels, or a potential added value that is not perceived as desirable, affects the adoption of *new* media in particular.

Although the perception of the costs did not seem to be the decisive factor in the older adults' decisions, it was still a weight on the other side of the balance. The role of the *cost side* of the balance may be considered in terms of *uncertainty* rather than in terms of effort or money, for example. The research in this thesis indicates that older adults are prepared to overcome barriers of effort, frustration, and expense, provided that the barrier is not perceived as a threat to the attainment of the desired outcome. Time-consuming and uncertain

cost, rather than substantial but clear cost, might discourage older adults from embracing new technology. Inexperienced and non-users of a new medium seem to be particularly prone both to misconceptions and overestimation of costs, and to not recognizing benefits, easily leading them to the conclusion that the costs of a new communication technology are high while the benefits are lacking.

To summarize, this research indicates three major preconditions for the adoption of new communication technology by older adults:

- The potential benefits of a new medium should be relevant from the perspective of older users, with respect to their specific communicative aspirations.
- These relevant benefits should be explicit and clear, which also prevents them from being perceived as 'lacking'.
- In addition, the potential costs involved in using a new medium should be transparent to the older user, particularly when the user is inexperienced, in order to reduce uncertainty about the attainment of the benefit.

## **6.2 Future research**

### ***6.2.1 Some theoretical considerations***

The cost-benefit balance turned out to be a simple and usable metaphor to study older adults' motivations for adopting or rejecting new technology. Moreover, the results of this research, presented in terms of costs and benefits, are generally consistent with the meta-theoretical framework of selective optimization with compensation (Baltes and Baltes, 1990), and with the socio-emotional selectivity theory (Carstensen, 1991; 1992). There is mounting evidence that the phenomena described in the Baltes and Baltes model and Carstensen's theory of socio-emotional selectivity cannot be ascribed to cohort effects: longitudinal studies have shown its validity across cohorts (Baltes & Lang, 1997; Lansford, Sherman, & Antonucci 1998). This may also imply the sustainability of the cost-benefit metaphor.

In the study on social networks, geographical distance was added as a variable to emotional closeness, in order to explicitly impose 'cost' on the maintenance of a - more or less 'beneficial'- relationship. This newly introduced

variable revealed that relationships perceived as beneficial are relatively insensitive to the cost of bridging a distance, as long as overcoming this cost is perceived as feasible. Both a higher age and the consideration of a future time perspective, rather than health limitations, were related to a strong preference for emotionally close relationships. Interpreting this result in terms of the Baltes and Baltes model, the participants' physical and mental resources were sufficient to make an effort, but were considered to be precious and were therefore spent selectively.

As was shown in earlier research on socio-emotional selectivity (see Fredrickson & Carstensen, 1990) the specific merits of the emotionally close relationship become more salient as we approach life's ending. This leads to the selection of emotionally close relationships by older adults, and to the abandonment of emotionally less meaningful relationships at the same time, which is largely voluntary. The primary motivation for this selectivity seems to be the perceived *benefits* of the relationship, which means an 'elective' selection, whereas the *costs*, associated with a 'loss-based' selection, seemed to play a secondary role (see also M. Baltes & Carstensen, 1999).

From a gerontechnological viewpoint, we may conclude from these results that older individuals do not necessarily perceive communication technology aimed at cost reduction as helpful in fulfilling their communicative aspirations. The merits of such technology may rather depend on its specific capability of supporting emotionally close relationships.

Cohort- or generation effects may partly explain why current generations of older individuals do not perceive the Internet as being capable of providing the desired communicative benefits: they have not been brought up to use Internet as a means for their intimate communications. Bikson and Bikson (2001) also touched on this problem, stating that the Internet "establishes a quite distinct avenue for exchange whose nature is still unclear and evolving." The comparison of new media with the established ones may impede the recognition of new merits. Moreover, the future development of the medium itself and its potential is unclear to current users and researchers.

Cohort effects, however, would not change the conclusions in this thesis with regard to the role of costs and benefits in the initial adoption of technology by (older) novices. However, recognizing these effects mitigates negative conclusions about Internet benefits for older adults' intimate communications and in future research about the merits of other new technologies.

### 6.2.2 Future gerontechnological research

The research in this thesis can be considered to be a starting point for further gerontechnological research. Such research may address in more detail the concrete implications of perceived benefits and the lack thereof for the adoption of new communication technology by older adults. The results and conclusions in this thesis are mainly on a conceptual level, but could be translated into the specific properties of a technological device and the concrete aspirations of the potential older user.

On the other hand, the insight gained from this research may not be confined to the currently available new media such as the cell phone and the e-mail or even to the topic of communication at large, nor to the current generation of older adults. This research was also an attempt to approach the adoption of currently new communication technology as *an example* of the adoption of innovations by older individuals. It shows that the perception of *benefits* of new technology deserves it to be a more central issue in the research on technology use in later adulthood.

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# Samenvatting

Het gebruik van nieuwe technologie op latere leeftijd wordt vaak geassocieerd met drempels en beperkingen. Met name het leren bedienen van onbekende apparaten kost gemiddeld meer tijd en moeite naarmate mensen ouder zijn. Dit zou de huidige generatie 65-plussers er bijvoorbeeld van weerhouden een computer aan te schaffen en zich op de elektronische snelweg te wagen, om zo te profiteren van de vele mogelijke voordelen die het internet ze te bieden heeft. Volgens dit uitgangspunt zijn het vooral negatieve factoren, oftewel *kosten*, die hun motivatie voor of tegen het gebruik van nieuwe technologie bepalen. Psychologisch en ergonomisch onderzoek naar het gebruik van technologie door ouderen heeft zich tot op heden voornamelijk geconcentreerd op het begrijpen en opheffen van mogelijke barrières, de kosten. Het onderzoek in dit proefschrift richt zich evenwel de afwezigheid of aanwezigheid van voordelen aan het gebruik van nieuwe technologie: de *baten*.

Door hun mentale en fysieke capaciteiten gericht en strategisch in te zetten, slagen veel mensen er tot op hoge leeftijd in hun welbevinden te handhaven. Binnen het domein van sociale relaties, bijvoorbeeld, concentreren mensen zich met het ouder worden in toenemende mate op directe familie en een beperkte kring van emotioneel nabije vrienden, waaraan ze dan ook relatief veel tijd en aandacht besteden, in plaats van op het in stand houden van een zeer uitgebreid sociaal netwerk. Je zou kunnen zeggen dat ze hun functioneren *optimaliseren* binnen een selectie van relaties en activiteiten die ze werkelijk belangrijk achten. Dit selectieve gebruik van energie richt zich vaak op het voortzetten van bestaande relaties en activiteiten, maar er kunnen ook nieuwe bijkomen, en oude vallen af.

Een criterium voor deze selectie is behalve de moeite die een relatie of activiteit kost, ook de betekenisvolheid ervan in het leven van de persoon in kwestie. In diens optiek moet de activiteit of relatie betekenisvol en waardevol genoeg zijn om er moeite voor te doen. Mensen lijken - bewust of onbewust - een soort kosten-batenanalyses te maken op een subjectieve weegschaal, met aan de ene kant de investering van energie, tijd en moeite, en aan de andere kant de verwachte 'winst' in termen van welbevinden, zoals dat bepaald wordt door sociaal-emotioneel functioneren, fysieke onafhankelijkheid en zelfontplooiing.

Met de leeftijd verandert geleidelijk de beleving van zowel 'moeite' als 'waarde'. Moeite wordt gemiddeld genomen wat zwaarder gewogen, wat mensen kritischer zou kunnen maken ten aanzien van de beloning die er tegenover staat. In de beleving van 'waarde' vindt onder andere een accentverschuiving plaats naar het hier en nu, met als mogelijk gevolg dat inspanningen die pas op de langere termijn hun vruchten af zullen werpen, in het bijzonder door oudere mensen als minder lonend en minder interessant worden ervaren.

Tegen deze achtergrond beschouwen we in dit proefschrift de aanvaarding en het gebruik van nieuwe *communicatietechnologie* op latere leeftijd. Enerzijds kost het moeite om bijvoorbeeld de computer te leren bedienen, maar het gebruik van e-mail kan de communicatie met vrienden en familie vergemakkelijken, en het internet zou een verruiming van iemands leefwereld kunnen betekenen.

Het doel van de vier studies in dit proefschrift was het verkrijgen van inzicht in de afwegingen die ouderen maken (of al hebben gemaakt) om wel of niet gebruik te maken van nieuwe communicatietechnologie, zoals e-mail. Een veronderstelling was dat in deze afweging behalve kosten ook baten een belangrijke rol spelen. Het onderzoek in dit proefschrift benadert het onderwerp vanuit verschillende invalshoeken: niet alleen het gebruik van communicatiemiddelen, maar ook sociale selectiviteit en de bereidheid tot uitstel van beloning door ouderen zijn onderzocht.

Hoofdstuk twee gaat over de *sociale selectiviteit* van zelfstandig wonende ouderen. Mensen in de leeftijd van 65 tot 70 jaar en van 80 tot 87 jaar werd gevraagd hun prioriteiten aan te geven in het onderhouden van de relaties binnen hun sociale netwerk, op de lange en de korte termijn.

Voor het in stand willen houden van contacten bleek de kwaliteit van de relatie in termen van *emotionele nabijheid* de doorslaggevende factor. Dit gold voor beide leeftijdsgroepen, maar voor de oudste groep in sterkere mate. De voorkeur voor emotioneel nabije contacten was in beide groepen groter in toekomstperspectief dan in het heden.

De te overbruggen barrière in termen van *geografische afstand* bleek een minder algemeen selectie criterium voor het willen behouden van relaties: geografische afstand was vooral negatief gerelateerd aan het behouden van emotioneel *niet* nabije contacten. De voorkeur voor het handhaven van emotioneel nabije contacten had onder geografische afstand nauwelijks te lijden. Dit gold ongeacht de leeftijd van de deelnemers.

Wel was de voorkeur voor geografische nabijheid groter onder de minder gezonde, en daardoor vaak minder mobiele deelnemers, en nam de voorkeur voor geografische nabijheid bij alle deelnemers toe in toekomstperspectief. Uit hun

mondelinge toelichtingen bleek dat het anticiperen op eventuele fysieke achteruitgang een rol speelde in hun overwegingen: de angst contacten op afstand noodgedwongen toch te zullen moeten opgeven leidde tot een sterkere voorkeur voor geografisch nabije contacten, vooral in toekomstperspectief.

Op grond van deze studie kunnen we concluderen dat de selectie van sociale relaties in de eerste plaats wordt bepaald door de *betekenis* die een relatie heeft voor de persoon in kwestie. Afstand (de moeite die het kost om afstand te overbruggen) gaat vooral tellen wanneer een contact als minder belangrijk wordt beschouwd, of wanneer het overbruggen van afstand door concrete of verwachte gezondheidsbeperkingen een absolute barrière dreigt te worden. Zolang mensen zichzelf echter fysiek in staat achten de benodigde moeite te doen, lijken ze die graag over te hebben voor de relaties die ze werkelijk belangrijk vinden. Meer algemeen gesteld: de weging van 'baten' lijkt belangrijker te zijn dan de weging van 'kosten', mits het overwinnen van die kosten als een optie wordt ervaren, en niet als een onmogelijkheid.

Hoofdstuk drie beschrijft een onderzoek naar *selectief mediagebruik* door ouderen. E-mailgebruikers (ervaren en onervaren) en e-mail-'weigeraars' (mensen die beslist geen e-mail zeiden te willen gebruiken) in de leeftijd van 60 tot 74 jaar vergeleken traditionele media, zoals de telefoon en de post, met e-mail en andere internettoepassingen, voor het bereiken van uiteenlopende communicatiedoelen in hun dagelijks leven. Voorbeelden zijn het verkrijgen van diverse informatie, het verzenden van berichten, het maken van afspraken, of even horen hoe het ermee gaat.

Ervaring met e-mail en het internet bleek de beste voorspeller voor een positieve algemene beoordeling van het nieuwe medium ten opzichte van traditionele media: ervaren gebruikers vonden het gebruik van het internet voor hun alledaagse communicatie aantrekkelijker dan onervaren gebruikers, terwijl de weigeraars er bijna niet over peinsden. Deze waarderingen verschilden echter per communicatiedoel, evenals de motieven die de deelnemers gaven, in alle drie de groepen.

De resultaten van dit deelonderzoek laten zien dat de beoordeling van e-mail behalve ervaringsgerelateerd ook doelgerelateerd is. Belangrijk is dat het medium vooral op zijn *merites* werd beoordeeld, die afhingen van de specifieke communicatiewensen en doelen van de gebruiker. De ingeschatte toegevoegde waarde van e-mail aan het bestaande mediaspectrum -of het ontbreken van toegevoegde waarde- leek voor frequente gebruikers, maar ook voor 'weigeraars', een belangrijker argument voor of tegen e-mailgebruik te zijn dan de ondervonden of verwachte geriefelijkheden dan wel moeilijkheden bij de bediening.

Het onderzoek beschreven in hoofdstuk vier is een verdere studie naar de waardering van nieuwe en traditionele communicatiemiddelen door oudere e-mailgebruikers en niet-e-mailgebruikers. In kleine *focusgroepen* bediscussieerden gemiddeld vier personen in de leeftijd van 65 tot 80 jaar hun eigen toepassing van alle mogelijke communicatiemiddelen naar aanleiding van negen alledaagse communicatiescenario's. Uitspraken over het gebruik van een communicatiemiddel in een bepaalde situatie (zo'n 3000 citaten) zijn vervolgens geanalyseerd met het oog op de door de proefpersoon aangegeven motivatie of overweging voor het gebruiken of juist niet gebruiken van een bepaald medium in die situatie.

Het totale aantal gemaakte positieve en negatieve opmerkingen over media-gebruik was gemiddeld genomen over alle media precies gelijk: 50% positieve en 50% negatieve commentaren. Voor communicatiemiddelen waarmee men veel ervaring had, zoals de telefoon, was het aantal positieve commentaren echter groter dan het aantal negatieve (60%-40%), terwijl het omgekeerde het geval was voor e-mail (34%-66%), waarmee men doorgaans minder vertrouwd was. Gebruikers van e-mail oordeelden wel weer aanmerkelijk positiever over het medium dan niet-gebruikers. Dit is niet verrassend gezien ook het resultaat van de studie in hoofdstuk drie. Een nadere beschouwing van de *samenstelling* van positieve en negatieve oordelen leverde echter een bijzonder inzicht op.

Positieve opmerkingen hadden voornamelijk betrekking op de *aanwezigheid* van baten (voordelen, nut, merites) van een medium, en niet zozeer op de *afwezigheid* van kosten (moeite, bedieningsproblemen, financiën.). Dit gold voor alle besproken media in alle deelnemersgroepen.

Voor negatieve oordelen was het, gemiddeld genomen, net andersom: deze oordelen doelden voornamelijk op de aanwezigheid van kosten van een medium, en voor een kleiner deel op de afwezigheid van baten. Hier echter was er een groot verschil tussen e-mail en de andere media, en daarbij ook nog tussen gebruikers en niet-gebruikers van e-mail.

Terwijl de negatieve beoordelingen van traditionele media voornamelijk werden bepaald door de aanwezigheid van kosten, bestond de negatieve beoordeling van e-mail voor een groot deel uit de *afwezigheid van baten*. Dit was in nog sterkere mate het geval in de oordelen van niet-gebruikers van e-mail.

De conclusie van deze studie is tweeledig: (1) Over gevestigde communicatiemiddelen en -wijzen (telefoon, post, persoonlijk bezoek) werd in termen van kosten en baten gesproken. Binnen de positieve oordelen hadden de baten de overhand, binnen de negatieve oordelen de kosten. Die kosten waren kleiner in aantal dan de baten, maar zeker niet verwaarloosbaar. Het lijkt dus zo te zijn dat het gebruik van een gevestigd medium berust op 'baten', waarbij een bepaalde

hoeveelheid 'kosten' wordt geaccepteerd en het gebruik van het medium niet verhindert. (2) Bij de beoordeling van het nieuwere medium e-mail was allereerst het aandeel negatieve oordelen veel groter dan voor gevestigde media. Vervolgens werd over e-mail gesproken in termen van kosten, baten, en de *afwezigheid van baten*. Die afwezigheid van baten, en niet de aanwezigheid van kosten, bepaalde het leeuwendeel van de relatief talrijke negatieve oordelen over e-mail. De positieve oordelen over e-mail bestonden net als bij de gevestigde media voornamelijk uit baten.

Behalve dat de *aanwezigheid van baten* een voorwaarde is voor het gebruiken van communicatiemiddelen, zou je uit deze bevindingen tevens kunnen afleiden dat negatieve oordelen, mogelijk leidend tot het verwerpen van *nieuwe* communicatietechnologie door ouderen, wel eens bepaald zouden kunnen worden door de *afwezigheid van baten*, en niet door de aanwezigheid van kosten. De relevantie van 'baten' voor de aanvaarding van, in dit geval, nieuwe communicatietechnologie wordt hiermee dubbel onderstreept.

Hoofdstuk vijf richt zich op de factor 'tijd' als context waarin ouderen in hun dagelijks leven keuzes maken. De waarneming van 'levenstijd' en 'uitsteltijd' op latere leeftijd zou het maken van keuzes -bijvoorbeeld de beslissing om te beginnen aan iets nieuws- kunnen beïnvloeden. Hoe groot is de bereidheid van ouderen om de ontvangst van een begeerd object of het bereiken van een gewenst resultaat (vgl. baten) uit te stellen? Worden mensen met de jaren geduldiger, zoals vaak wordt gedacht, of neemt de bereidheid om te wachten juist af? Uiteraard hangt dat af van het type object of resultaat: is het bijvoorbeeld een geldbedrag, is het een verre reis, of is het een (nog te leren) vlekkeloze e-mailcommunicatie met een kleinkind aan de overkant van de oceaan?

Het is een bekend psychologisch fenomeen dat door uitstel de subjectieve waarde van een te ontvangen beloning vermindert (dit wordt *temporal discounting* genoemd). Een mogelijke verklaring is dat mensen simpelweg niet van wachten houden; *ongeduld*. Een andere verklaring is dat het verstrijken van de tijd risico's met zich meebrengt. Er kan in de tussentijd van alles gebeuren waardoor het gewenste object of resultaat niet meer interessant is, of het ontvangen of bereiken ervan twijfelachtig wordt; het verstrijken van de tijd impliceert ook *onzekerheid*.

Om de invloed van uitsteltijd op de waarde van toekomstige beloningen in verband met leeftijd te onderzoeken, is in hoofdstuk vijf gekozen voor het (laten) uitstellen van vakanties door jongere en oudere mensen. Een aantal mensen van 40 tot 45 jaar en van 70 tot 75 jaar werd gevraagd een hypothetische verre (tevens heel mooie) reis en een minder verre reis naar keuze met verschillende termijnen uit te

stellen, en dan te kiezen tussen de beide uitgestelde reizen. De vragen werden steeds zo geformuleerd dat ze een dilemma opleverden: op de favoriete reis moest altijd langer gewacht worden dan op de iets minder aantrekkelijke reis. Bijvoorbeeld wanneer iemand 'twee maanden China' als favoriete bestemming had en 'een paar weken Ierland' als tweede keus: "Welke vakantie heeft u liever, twee maanden naar China over zes jaar, of twee weken naar Ierland, komende zomer?" De uitsteltijden werden systematisch gevarieerd. De deelnemers werd gevraagd hun keuzes te motiveren.

De resultaten laten zien dat de oudere groep tot aanmerkelijk minder uitstel bereid was dan de jongere groep. Op een gegeven moment was de mooiste reis niet meer interessant omdat de intrinsieke waarde ervan niet opwoog tegen de afbreuk die het langere wachten deed aan de 'praktische' waarde. Veelgemaakte opmerkingen waren in de trant van "wat heb ik aan een schitterende reis wanneer ik er door m'n gezondheid mogelijk niet meer van kan genieten, over zes jaar, en wie zegt dat ik dan nog zin heb om naar China te gaan?" De motivatie was vrijwel altijd *onzekerheid* inherent aan het verstrijken van de tijd, met name in verband met de fysieke gezondheid van de persoon zelf of een eventuele reispartner, zelfs wanneer die gezondheid op dat moment prima was. De jongere deelnemers maakten deze afweging niet, tenzij hun huidige gezondheid daartoe concreet aanleiding gaf.

Dit experiment liet zien dat behalve de waarde van een object of resultaat zelf, ook de 'verkrijgbaarheid' of 'haalbaarheid' een rol speelt in de uiteindelijke waardering ervan. Allereerst moet iets natuurlijk in zichzelf de moeite waard zijn, maar wanneer de persoon in kwestie inschat dat het genieten van de beloning wel eens heel lang op zich kan laten wachten, met alle onzekerheden van dien, wordt een prachtige belofte al snel minder interessant.

De tolerantie voor uitstel lijkt lager te zijn op hogere leeftijd. Dit resultaat is in overeenstemming met de resultaten van de studie over sociale selectiviteit, waarbij de inschatting dat een contact praktisch gezien niet gehandhaafd zou kunnen worden, uiteindelijk leidde tot het (hypothetisch) laten varen ervan op de langere termijn. De intrinsieke waarde van het contact verlette dit zolang de barrière, de geografische afstand in dat geval, als overkomelijk werd ingeschat.

Wat betekenen de uitkomsten van deze vier deelstudies voor de aanvaarding en het gebruik van nieuwe communicatietechnologie op latere leeftijd? In grote lijnen, nog los van het gebruik van communicatiemiddelen, geven deze studies een bepaalde mentaliteit van de deelnemers weer, die voor een deel is terug te voeren op leeftijdsgerelateerde mentale en fysieke veranderingen. Voorbeelden zijn een speciale sociale selectiviteit en de in het algemeen geringer wordende bereidheid tot

het uitstellen van profijt. De afweging van kosten tegen baten en de beoordeling van een communicatiemiddel op zijn merites -op zichzelf waarschijnlijk eerder algemeen-menselijke dan leeftijdsgebonden verschijnselen- worden daardoor beïnvloed. De in dit proefschrift onderzochte leeftijdsgerelateerde veranderingen lijken aanleiding te geven tot een extra kritische beschouwing van innovaties, die tot uiting komt in deels een andere, en deels een scherpere weging van kosten tegen baten. Voor het begrijpen van de acceptatie van innovaties door ouderen lijkt het belangrijk dit in gedachten te houden.

Voor de aanvaarding en het gebruiken van nieuwe communicatietechnologie op latere leeftijd kunnen we op grond van dit proefschrift concluderen dat de volgende voorwaarden belangrijk zijn:

- *Zinnigheid* van het nieuwe medium  
De mogelijke voordelen, of 'baten', van een nieuw communicatiemiddel moeten relevant zijn vanuit het perspectief van de oudere gebruiker, met diens specifieke sociale en communicatieve aspiraties.
- *Zichtbaarheid* van de voordelen  
Deze relevante voordelen moeten voor de potentiële gebruiker expliciet en duidelijk zijn, ook om te voorkomen dat ze expliciet als 'afwezig' worden waargenomen.
- *Zekerheid* over het zullen profiteren van die voordelen  
Mogelijke 'kosten', zoals het leren bedienen van een apparaat, moeten behalve overkomelijk, ook transparant zijn voor de oudere gebruiker, vooral wanneer deze onervaren is, om de onzekerheid over het verkrijgen van het beoogde voordeel te verkleinen.

Dit onderzoek is uitgegaan van communicatietechnologie die op dit moment nieuw is voor de huidige generatie ouderen. De resultaten zijn echter grotendeels conceptueel, zodat het verkregen inzicht ook behulpzaam kan zijn bij het begrijpen van de aanvaarding van andere technologische innovaties door latere generaties ouderen. De ideeën, zoals over de weging van kosten en baten, de perceptie van nut en waarde van een technologische toepassing, en duidelijkheid omtrent de te nemen drempels (kosten) zouden bovendien concreet kunnen worden ingevuld en dan als richtlijnen kunnen dienen bij het toegankelijk maken van nieuwe technologie voor ouderen. Die invulling verschilt uiteraard per concrete (waarschijnlijk nu nog onbekende) technologische innovatie, die ooit op het punt zal staan geaccepteerd dan wel afgewezen te worden door weer een nieuwe generatie mensen die er op latere leeftijd mee geconfronteerd wordt en die er mogelijk van kan profiteren.



## Curriculum vitae

December 29, 1970	Born in Oldenzaal, The Netherlands
1983-1990	VWO, Thijcollege, Oldenzaal
1990-1991	Dutch Language and Literature, Nijmegen University, The Netherlands
1991-1996	Psychology, Nijmegen University
1993-1994	Experimental and Neuropsychology
1994-1996	Psychogerontology (M.A. 1996, met genoegen)
1996-1998	Research assistant at the Department of Psychogerontology, Nijmegen University, and the Institute for Gerontechnology, Eindhoven University of Technology
1998-2002	Graduate student at Eindhoven University of Technology
2000-2001	A 6-month stay at Georgia Institute of Technology, School of Psychology, Atlanta
Oct. 2001	Arnold M. Small Memorial Award for best student paper in the Aging Technical Group, HFES 45 <sup>th</sup> Annual Meeting, Minneapolis