

## Older Adults' Motivated Choice for Technological Innovation: Evidence for Benefit-Driven Selectivity

Anne-Sophie Melenhorst  
Technische Universiteit Eindhoven and  
Georgia Institute of Technology

Wendy A. Rogers  
Georgia Institute of Technology

Don G. Bouwhuis  
Technische Universiteit Eindhoven

This study examined older adults' motivation to adopt technological innovation. Sixty-eight older e-mail users and nonusers discussed the use of e-mail and of traditional communication methods in 18 focus groups. The results show older adults' benefit-driven approach to new communication technology. Regardless of whether their decision about the new technology was positive or negative and irrespective of their e-mail experience, participants focused on benefits rather than costs. For traditional media, *both* costs and benefits were important. Results contradict the common belief that barriers such as usability problems determine whether older people use new technology and indicate the decisive role of perceived benefits for successful innovation.

**Keywords:** aging, motivation, technology acceptance, innovation, cost/benefit

Technological innovation is a common and recurring phenomenon affecting both older and younger individuals in modern societies. The adoption of new technology involves ability and motivation, and it usually requires investment by the user. The investment could be financial, but users may also invest time and effort and encounter frustration until the use of the new technology is integrated into their lives. What motivates older adults to try something new, and are there specific reasons why older individuals might not be motivated to adopt innovations?

---

*Editor's Note.* Laura Carstensen served as the action editor for this article.—RTZ

---

Anne-Sophie Melenhorst, Department of Technology Management, Technische Universiteit Eindhoven, Eindhoven, the Netherlands, and School of Psychology, Human Factors and Aging Laboratory, Georgia Institute of Technology; Wendy A. Rogers, School of Psychology, Human Factors and Aging Laboratory, Georgia Institute of Technology; Don G. Bouwhuis, Department of Technology Management, Technische Universiteit Eindhoven.

This article is based on Anne-Sophie Melenhorst's doctoral dissertation. The research was conducted under the auspices of the J. F. Schouten School for User-System Interaction Research, Technische Universiteit Eindhoven. Portions of this research were presented at the October 2001 annual meeting of the Human Factors and Ergonomics Society in Minneapolis, Minnesota. This work was supported in part by National Institutes of Health, National Institute on Aging Grant P01 AG17211 (a seed grant entitled "Use of Communication Technologies by Older Adults: Benefits From the User's Perspective") under the auspices of the Center for Research and Education on Aging and Technology Enhancement. We thank Evan Caylor for his assistance with the coding and Sara Czaja, Trinidad Argüelles, Chin Chin Lee, and Sankaran Nair from the University of Miami for facilitating the data collection in Miami, Florida.

Correspondence concerning this article should be addressed to Anne-Sophie Melenhorst, who is now at the Department of Business, Public Administration, and Technology, University of Twente, BBT-STeHPS, PO Box 217, 7500 AE Enschede, the Netherlands. E-mail: a.s.melenhorst@utwente.nl

The study of motivational factors in older adults' technology use has received little scientific attention. We see this gap reflected in the relatively small amount of aging research on motivation in general (see Lawton, Moss, Winter, & Hoffman, 2002). Human factors research to date has extensively addressed the understanding and leveling of potential technology barriers for older individuals, which suggests that it is barriers that keep older adults from adopting technological innovations (for a review, see W. A. Rogers, Stronge, & Fisk, in press). Indeed, older individuals in particular may perceive the learning of new skills as a serious obstacle. Age-related changes and declines of sensory and cognitive abilities (e.g., Craik & Salthouse, 2000) affect the ability to learn to handle technological equipment (e.g., Cody, Dunn, Hoppin, & Wendt, 1999; Kelley & Charness, 1995; W. A. Rogers, Gilbert, & Cabrera, 1997).

However, other research shows the relevance of the perception of technology benefits, beside costs, for technology adoption (e.g., Sharit, Czaja, Perdomo, & Lee, 2004). A recent study suggested that older adults might not be motivated to buy a computer or to learn new skills, even if they could, as they do not perceive the expected result as desirable or helpful in fulfilling their aspirations (Melenhorst & Bouwhuis, 2004). The lack of perceived benefit and not the perception of cost seemed to have motivated their negative opinions of new technology.

We designed a study to examine further older adults' positive and negative motivations for using or not using new technology, and the role of perceived cost and benefit therein. The focus was on the use of new communication technology, specifically e-mail, by older e-mail users and nonusers. We chose e-mail because it was relatively new at the time of the study, involved potential benefits and costs for older adults, and was used by part of the older population.

The focus group method (Krueger, 1994) was appropriate to capture the participants' motivations, as the method allows structured, yet open data collection and data analysis. Focus group

participants discussed motivations for their communication preferences for different communication situations. Both e-mail use and the use of other methods, such as the mail or the telephone, were considered for a variety of goals. The participant sample consisted of older Dutch and American e-mail users and nonusers of various ethnic origins to provide diversity across and within cultures.

The purpose was to collect detailed, authentic participant motivations for media use and to abstract the data afterward, in terms of positives and negatives, or costs and benefits, for example. To avoid a biased discussion, we asked about reasons for considering or not considering a communication method but did not emphasize the role of barriers (costs) and skills or the presence or absence of benefits.

Is perceived cost the decisive factor in older adults' technology judgments, as we are inclined to think, or does benefit perception also play a role, in both positive and negative motivations? How do motivations of users and nonusers differ, and, in addition, do judgments of an innovation (in this case e-mail) differ from judgments of established communication methods (e.g., the mail or the telephone) or of another new medium such as a cell phone?

Previous research has shown that technology experience is positively related to technology appreciation (e.g., Czaja & Sharit, 1998; Ellis & Allaire, 1999; Melenhorst & Bouwhuis, 2004). Hence, we expected that the e-mail users in our study would value e-mail more highly than would the e-mail nonusers, and participants in general would value traditional communication methods more highly than e-mail.

Currently unknown, however, is how older e-mail users and nonusers motivate their positive and negative value judgments of traditional and new media. For example, the role of benefit in both positive and negative technology judgment seems relevant but is unclear. This study examined motivation differences between groups and across communication methods that reveal critical factors in the adoption or rejection of new communication technology by older individuals.

## Method

### Participants

This study included American and Dutch participants. The American focus group participants consisted of 48 independently living older adults (29 women and 19 men) in the age range from 65 to 80 ( $M = 71.2$ ,  $SD = 4.9$ ). The sample was ethnically diverse; 25% were African American, 10% Hispanic, and 65% Caucasian. We selected participants from research volunteer pools in Atlanta, Georgia, and in Miami, Florida. The 13 focus groups consisted of 3 to 5 (with an average of slightly below 4) participants. We conducted eight group meetings in Atlanta and five in Miami. Six groups consisted of e-mail users, and seven of e-mail nonusers. 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 years ( $M = 71.1$ ,  $SD = 3.9$ ), 9 women and 11 men, 80% Caucasian and 20% of other ethnic origins (one person came from Spain, one from Surinam, and two from Indonesia). We selected them from a research volunteer pool at Eindhoven University. The five focus groups consisted of 4 participants each, two groups of e-mail users and three of e-mail nonusers. We conducted the sessions in Eindhoven, a medium-sized city in the Netherlands. The volunteers received €10 (\$13) for their participation. E-mail users in both samples were slightly more highly educated than e-mail nonusers; they more often had a bachelor's or a master's degree, whereas nonusers typically had 3 or 4 years of high school.

### Procedure

The focus group participants completed a questionnaire to supply information about demographics and technology use. At the beginning of the session, the participants received scenario booklets containing a broad range of everyday communication goals (see Table 1). The focus groups were scenario based (i.e., not question based) to enhance an open discussion. Scenarios were created based on pilot studies to cover a broad range of common communication goals and to give participants the opportunity to talk about diverse communication methods and aspects of use. In each 2 1/2-hr session, the participants discussed the 10 communication goals, beginning with the question, "Which communication means or method would you most likely use to . . .?" The moderator asked for personal experiences and kept the participants focused on their motivations to use particular communication methods in a particular situation. Next, the discussion was directed to the method or methods participants would not use in the given situation. Finally, the use of e-mail in the scenario was explicitly introduced, both in the groups of e-mail users and in the groups of nonusers. Each session was recorded on audiotape.

### Transcription, Selection, Coding, and Analysis

Professional transcribers transcribed the sessions verbatim. Participants' motivations for applying a communication method for a particular communication goal were selected from the transcripts for further analysis. The 2,996 quotes, 1,329 from e-mail users ( $M = 166.1$  quotes per transcript,  $SD = 13.8$ ) and 1,667 from e-mail nonusers ( $M = 166.7$ ,  $SD = 16.4$ ), were categorized according to a set of criteria to label qualitative data systematically (i.e., a coding scheme). The construction of the coding scheme for the analyses was partly a bottom-up, or data-driven process (consistent with grounded theory; e.g., Glaser & Strauss, 1967), and partly a top-down, or concept-driven process, whereby concepts from a previous study (Melenhorst & Bouwhuis, 2004), such as benefit and cost, determined the perspective of the analyses. The coding scheme (see Table 2) consisted of three main categories with subcategories: first, the communication goals that were explicitly introduced during the focus group session; second, the communication methods mentioned by the participants; and third, the types of motivation, referring to the participants' reasons or considerations to choose a method for a goal.

This article focuses on the four motivation types referring to *value*, that is, a positive or a negative judgment about using a communication method (see Table 2). A positive comment, also referred to as positively directed, could indicate either a benefit or an absent cost. A negative (negatively directed) comment could be either a cost or an absent benefit. The analyses in the remainder of this article apply to the participants' comments that expressed such value judgments, accounting for 70% (2,076 quotes) of the data set.<sup>1</sup> This selection was based on coded data; it was made after the coding was performed for the complete set of 2,996 quotes.

Two coders independently categorized the selected quotes (i.e., the full data set of 2,996 quotes) according to the coding scheme. The interrater agreements for the goals, methods, and motivations were 86%, 98%, and

<sup>1</sup> Seventy percent of the quotes (2,076) represented positively or negatively directed motivations about using the five communication methods for the 10 communication goals in the coding scheme and were included in this article. The remaining 30% of the quotes were not presented for either of two reasons: They did not motivate the adequacy of a method to serve a communication purpose but expressed habit (e.g., "We are used to the telephone") or 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" (26%), or they commented on various, relatively rare communication methods such as the fax, the telegram, or the Western Union money order (4%).

Table 1  
*Communication Goal and Corresponding Scenario Description*

Goal	Scenario description
Stay in touch nearby, <sup>a</sup> stay in touch far away <sup>b</sup>	You want to know how another person is doing and keep in touch on a regular basis. You know each other very well, so you would like to have some frequent form of contact. At least once a month.
Invite good friends	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.
Share bad news	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.
Make an appointment	You need to set a time for a leisure activity with somebody else. For example to play tennis this week, or dominos, or to decide about the time for next week's meeting with the biking club.
Give emotional support	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. You would like to have contact at least once a week.
Share good news	You're happy or lucky and you want to share it with other people. You can't wait and want to shout it from the rooftops! For example, you became a granddad/grandma, or you won \$50,000 in the lottery.
Offer congratulations	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.
Have a chat	You just feel like some chat or contact with another person. It doesn't matter exactly with whom; you don't have a specific person in mind.
Send a practical message	You want to pass a small practical message to an acquaintance or somebody you met at a party. You promised a recipe, the name of a nice restaurant, or a book title. It is not really important, just being nice.

<sup>a</sup> This person lives less than a half an hour away. <sup>b</sup> This person lives more than an hour away.

84% (kappas of .82, .98, and .80), respectively. These kappa coefficients apply to all of the 10 goals; the methods, which included cellular phone (also referred to as *cell phone*), e-mail, mail, telephone, and visit; and the four motivation types, which consisted of benefit, absent cost, cost, and absent benefit. Coding details about subcategories are available from Anne-Sophie Melenhorst (see Melenhorst, 2002a).

Data are presented regardless of gender, nationality, or ethnical background, because differences in media judgments appeared unrelated to

these characteristics. We present the results on motivations of e-mail users and nonusers separately in this article when there were significant differences between these groups. To identify deviating patterns in the data, we performed chi-square tests of homogeneity with absolute numbers. The standardized test residuals indicated the motivation categories mainly responsible for the statistical effect. A residual with a value larger than 2.00 indicates a significant contribution (Haberman, 1973). The greater-than-2.00 rule of thumb approximates the two-tailed critical value of  $z$  at the  $\alpha = .05$  level of significance (Beasley & Schumacker, 1995).

## Results

The results presented herein show that e-mail and traditional methods were judged differently in general. In addition, only e-mail was judged differently by e-mail users and nonusers, who judged traditional communication methods similarly. Benefit and the absence of benefit accounted primarily for the motivation differences found.

### *Positive Versus Negative Motivations for All Media*

We assumed that the value (valence) of the participants' motivations (i.e., positively or negatively directed) indicated the likelihood of using a particular communication method. We first established a "valence baseline" for the total data set, as a reference point for separate media and participant groups. In other words, did participants in this study motivate their media preferences positively or negatively in general?

Figure 1 shows the distribution of motivations for all media combined and for each medium separately. For all media combined, positively directed (i.e., benefit and absent cost) and nega-

Table 2  
*Communication Goal, Communication Method, and Motivation for Media Use Addressed in Focus Groups and Coding Scheme*

Coding scheme category	Coding scheme subcategory
Communication goal	Stay in touch nearby Invite good friends Make an appointment Share good news Have a chat Stay in touch far away Share bad news Give emotional support Offer congratulations Send a practical message
Communication method	Cell phone E-mail Mail Telephone Visit
Motivation	Positively directed Benefit (advantage of using a communication method) Absent cost (absence of a disadvantage of using a communication method) Negatively directed Cost (disadvantage of using a communication method) Absent benefit (absence of an advantage of using a communication method)

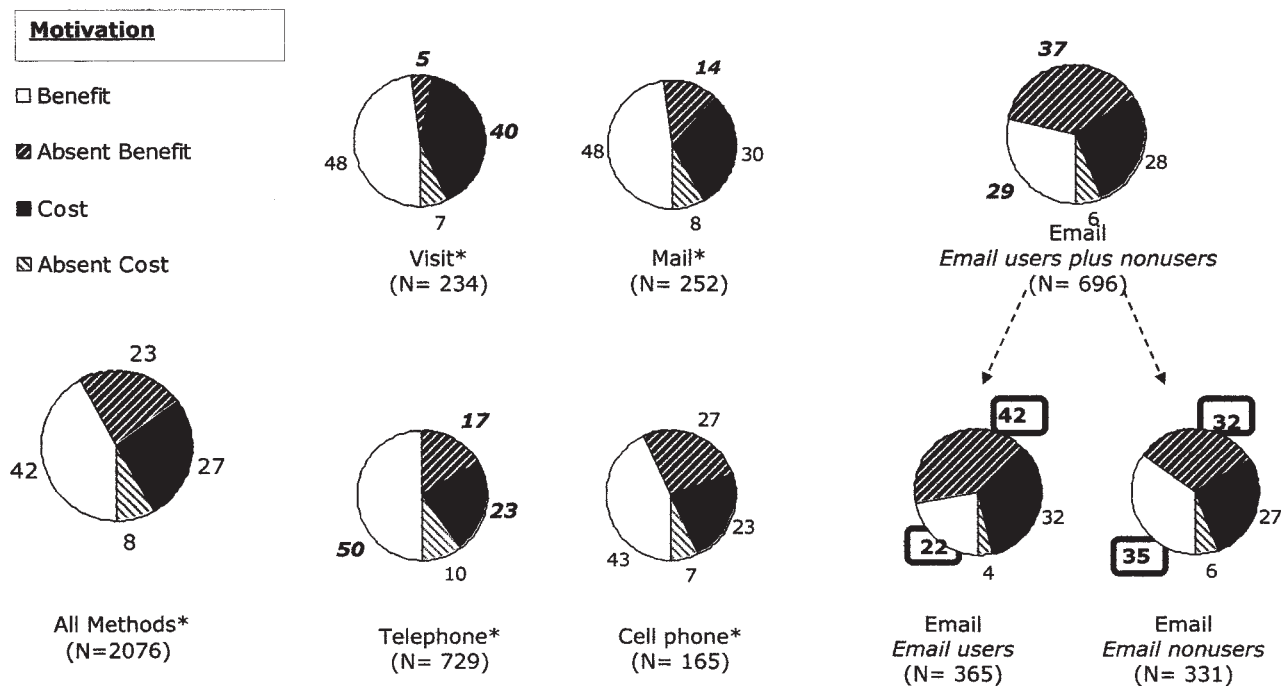


Figure 1. Motivation categories (percentages) for using all communication media (lower left) and communication methods separately (middle), including e-mail (right) subdivided in users and nonusers. Percentages in boldface refer to significant differences from "All Methods." Percentages in boxes refer to differences between e-mail users and nonusers. \*Motivations by e-mail users and nonusers did not significantly differ for these media; diagrams represent the total participant sample.

tively directed (i.e., cost and absent benefit) motivations each accounted for 50% of the total motivations in this study. This applied to the total participant sample, but also to each participant subsample (not shown in Figure 1), irrespective of gender, nationality, or ethnic background. The e-mail users expressed slightly more positive motivations (53%) for all media than did the e-mail nonusers (48%), but the difference was not significant. Thus, the total data set was practically unbiased with respect to positive and negative motivations in general.

#### Positive Versus Negative Motivations Compared Across Media

Consistent with our expectations, participants judged e-mail more negatively than the other media, regardless of whether they used e-mail. A chi-square test of homogeneity including the five communication methods and positively and negatively directed motivations showed a significant effect,  $\chi^2(4) = 106.4, p < .0001$ . The test residuals indicated that e-mail yielded significantly more negatively directed motivations (65%; see Figure 1, upper right) than all media (50%; see Figure 1, left). The telephone showed fewer negative motivations (40%). In addition, e-mail was judged more negatively by e-mail nonusers than by e-mail users (74% and 59% negatively directed motivations, respectively),  $\chi^2(1) = 17.56, p < .0001$ .

#### What Makes E-Mail Motivations More Negative and Less Positive?

Figure 1 shows that negative e-mail motivation differed from negative motivation for using other media because of the large size of the absent benefit category (37%; upper right). In addition, the small amount of positive e-mail motivations was due to the smaller size of the benefit category (29%). These differences were significant according to the chi-square test for the five media, including benefit, absent cost, cost, and absent benefit,  $\chi^2(12) = 185.77, p < .0001$ . Thus, the sizes of the benefit-based categories (i.e., benefit and absent benefit) were decisive for the amounts of both positively and negatively directed motivation. Benefit made the difference between e-mail and the other media.

#### E-Mail Users Versus Nonusers

E-mail users and nonusers did not judge the telephone differently (i.e., Group  $\times$  Motivation Type),  $\chi^2(3) = 5.69, ns$ , nor did their motivations for the cell phone, the visit, and the mail differ, for which the  $\chi^2(3)$  values were 1.88, 0.83, and 0.83, respectively. Only e-mail showed significant motivation differences between users and nonusers,  $\chi^2(3) = 18.61, p < .0001$ , in addition to the different amounts of negatively and positively directed motivations reported earlier.



The residuals of the chi-square test for e-mail indicated that benefit and absent benefit accounted for the statistical effect, that is, the benefit category in positive e-mail motivation and the absent benefit category in negative e-mail motivation (see Figure 1, lower right). Compared with the e-mail users, the e-mail nonusers mentioned fewer benefits of e-mail and made more comments about the explicit lack of benefits of e-mail.

### *How Does E-Mail Compare With Another New Technology?*

The results for cell phones, also a relatively new medium, showed similarity to the results for e-mail. In particular, the amount of absent benefit for cell phones seemed large compared with the three traditional media but did not differ significantly (refer to Figure 1). Cell phone ownership and e-mail ownership were unrelated in this sample; 71% of the e-mail users and 68% of the e-mail nonusers owned a cell phone.

### Discussion

To the extent that a communication method was novel (i.e., introduced in society relatively recently), it was judged more negatively and the composition of negatively directed motivation changed; "absent benefit" overruled cost. The perception of absent benefit accounted for the large amounts of negatively directed e-mail motivations, especially for e-mail nonusers. Cost, such as effort, expenses, and lack of skills, could not explain the negative e-mail motivations. Moreover, a considerable amount of cost was perceived for all of the established media. Indeed, the total amount of perceived e-mail costs did not differ much from the amount of perceived costs of the telephone, a popular and well-established communication medium.

Benefit was important in that it can be considered as the definitive incentive for using a medium and consistently dominated positively directed motivation. Benefit perception explained the contrast between the amounts of positive e-mail motivations and positive motivations for using other communication methods. Small amounts of positive motivations were mainly due to fewer perceived benefits. E-mail yielded fewer benefits than other methods, the least from the e-mail nonusers, which was consistent with the respective amounts of positively directed motivations.

In summary, this study showed that benefit perception was decisive for both the amounts of positive and negative motivation for an innovation compared with traditional methods. Costs were perceived but seemed to be accepted for traditional methods; these methods were still valued and commonly used. Cost did not account for the larger amounts of negative e-mail motivations, which contradicts the idea that primarily costs keep older adults from using new technology. That is, when asking the question of why older adults may not use a particular type of technology, the answer is not because the costs are too high; the answer is because the benefits of that technology are not apparent to the older adults. Either the technology in question does not meet the needs of older adults, or older adults do not understand it well enough to perceive the benefits.

### *Experience: A Cause or an Effect of Technology Appreciation?*

Consistent with earlier research (e.g., [Czaja & Sharit, 1998](#); [Ellis & Allaire, 1999](#); [Melenhorst & Bouwhuis, 2004](#)), we found

that e-mail appreciation was positively related to e-mail experience. Both experienced and inexperienced participants judged the medium more negatively than they judged traditional communication methods, with which all had more experience. The exclusive difference between e-mail users and nonusers in e-mail motivation underscored the relationship with experience: E-mail nonusers judged only e-mail more negatively than did their e-mail-using peers.

Qualitative results of this study (refer to [Melenhorst, 2002a](#)) suggested that experience, in part, was a consequence of benefit perception. Negative motivations, the perception of absent benefit in particular, might have kept people from becoming experienced, rather than lack of experience being the reason for negative motivation. For example, the participants mentioned personal preferences (e.g., valuing an intimate, "warm" communication), specific circumstances (e.g., children overseas), or social circle ("none of my friends use e-mail") as the basis for their judgments.

On the other hand, the conceptual novelty of e-mail for e-mail nonusers and, to a lesser degree, for e-mail users, might in part explain the perception of low benefit and high absent benefit in both groups. An example of benefit recognition, or maybe benefit "discovery," following individuals' overcoming their unfamiliarity with e-mail, was the enhanced and extended communication mentioned by e-mail users (e.g., the frequent exchange of small bits of news, or sending e-pictures), which would have been hard to perceive for nonusers. In addition, one's level of education might be related to one's ability to recognize potential benefits, for example. In our study, e-mail users were slightly higher educated than e-mail nonusers; in contrast, educational levels of cell phone users and nonusers were equal.

The cell phone was also a relatively new medium but was very similar to an established method: the regular telephone. The natural comparison because of this similarity made the benefits easier to recognize (cf. [Hoeffler, 2003](#)) but might have diminished the appeal of the "added value" at the same time (cf. [E. M. Rogers, 2003](#)), meaning absent benefit. Many participants owned a cell phone because they considered it as typically useful in case of emergency outside the home and were inclined to use it selectively. This is consistent with the neutral rather than positively directed cell phone evaluation for other communication goals (the telephone was considered appropriate and sufficient for these) and with the large amount of absent benefit motivating negatively directed cell phone judgment.

In conclusion, e-mail, and possibly any new technology, might be prone to nonadoption due to the perception of absent benefit rather than the anticipation of cost. The relationship between experience and appreciation may be explained in terms of benefit as well. The present study indicates that the expectation of benefit is imperative to motivate innovation: People need an incentive to consider expending effort to make a change. The lack of benefit is sufficient to prevent people from trying something new. To evaluate an innovation and predict its adoption, one should perhaps consider the benefits to the users more so than the costs to the users.

### *Technology Adoption: A Selection Process in Terms of Selective Optimization With Compensation (SOC) and Socioemotional Selectivity Theory (SST)*

Life span theories of successful aging, for example, SOC ([Baltes & Baltes, 1990](#)) and SST ([Carstensen, 1991](#)), predict parsimonious

and selective use of resources with age; people increasingly tend to use their limited energy and lifetime for activities and domains that they perceive as being most essential and valuable in their lives. According to SST, the perception of limited future time (which is correlated with chronological age) motivates such selectivity in particular. Older adults are more present oriented and less willing to spend their time in an unpleasant way for a future goal (e.g., Carstensen, Isaacowitz, & Charles, 1999; Melenhorst, 2002b). An SST explanation of our results would be that technology adoption is less appealing if the time horizon for payoff is short.

The results of our study seem to contradict the idea that coping with dwindling resources is one of the major challenges of old age, for which the avoidance of cost (i.e., not wasting one's time and energy) seems a priority. Although older adults' selectivity as described by SOC is eventually motivated by limitations, the selection process itself is inherently benefit driven (see Baltes, 1987). Older adults critically select and deselect activities based on merit because their resources are precious. Any investment of energy is a waste for an activity or innovation that does not yield a benefit, but the energy is worth spending on something valuable. Hence, an erroneous conclusion of previous research would be that cost reduction would automatically encourage older adults to use new technology. Although cost can be an obstacle for older adults in selecting an activity, more likely the absence of benefit is the key factor.

In conclusion, benefit is the primary incentive, and absent benefit the primary disqualifier for innovation to emerge in people's activity repertoire. Older adults' careful use of resources, compared with that of younger adults, might strengthen this effect. Although age groups were not compared in this study, theories such as SOC and SST are consistent with our finding that benefit perception is decisive in older adults' choice for innovation.

## References

- Baltes, P. B. (1987). Theoretical propositions of life-span developmental psychology: On the dynamics between growth and decline. *Developmental Psychology*, 23, 611–626.
- Baltes, P. B., & Baltes, M. M. (1990). Psychological perspectives on successful aging: The model of selective optimization with compensation. In P. B. Baltes & M. M. Baltes (Eds.), *Successful aging: Perspectives from the behavioral sciences* (pp. 1–34). New York: Cambridge University Press.
- Beasley, T. M., & Schumacker, R. E. (1995). Multiple regression approach to analyzing contingency tables: Post hoc and planned comparison procedures. *Journal of Experimental Education*, 64, 79–93.
- Carstensen, L. L. (1991). Selectivity theory: Social activity in life-span context. *Annual Review of Gerontology and Geriatrics*, 11, 195–217.
- Carstensen, L. L., Isaacowitz, D. M., & Charles, S. T. (1999). Taking time seriously: A theory of socioemotional selectivity. *American Psychologist*, 54, 165–181.
- Cody, M. J., Dunn, D., Hoppin, S., & Wendt, P. (1999). Silver surfers: Training and evaluating Internet use among older adult learners. *Communication Education*, 48, 269–286.
- Craik, F. I. M., & Salthouse, T. A. (Eds.). (2000). *The handbook of aging and cognition*. Mahwah, NJ: Erlbaum.
- Czaja, S. J., & Sharit, J. (1998). Age differences in attitudes towards computers. *Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, 53, P329–P340.
- Ellis, R. D., & Allaire, J. C. (1999). Modeling computer interest in older adults: The role of age, education, computer knowledge, and computer anxiety. *Human Factors*, 41, 345–355.
- Glaser, B. G., & Strauss, A. L. (1967). *The discovery of grounded theory: Strategies for qualitative research*. New York: Aldine Publishing.
- Haberman, S. J. (1973). The analysis of residuals in cross-classified tables. *Biometrics*, 29, 205–220.
- Hoeffler, S. (2003). Measuring preferences for really new products. *Journal of Marketing Research*, 406–420.
- Kelley, C. L., & Charness, N. (1995). Issues in training older adults to use computers. *Behaviour & Information Technology*, 14, 107–120.
- Krueger, R. A. (1994). *Focus groups: A practical guide for applied research*. Thousand Oaks, CA: Sage.
- Lawton, M. P., Moss, M. S., Winter, L., & Hoffman, C. (2002). Motivation in later life: Personal projects and well-being. *Psychology and Aging*, 17, 539–547.
- Melenhorst, A. S. (2002a). *Adopting communication technology in later life: The decisive role of benefits*. Unpublished doctoral dissertation, Technische Universiteit Eindhoven, Eindhoven, the Netherlands.
- Melenhorst, A. S. (2002b). Making decisions about future activities: The role of age and health. *Gerontechnology*, 1, 153–162.
- Melenhorst, A. S., & Bouwhuis, D. G. (2004). When do older adults consider the Internet? An exploratory study of benefit perception. *Gerontechnology*, 3, 89–101.
- Rogers, E. M. (2003). *Diffusion of innovations*. New York: Free Press.
- Rogers, W. A., Gilbert, D. K., & Cabrera, E. F. (1997). An analysis of automatic teller machine usage by older adults: A structured interview approach. *Applied Ergonomics*, 28, 173–180.
- Rogers, W. A., Stronge, A. J., & Fisk, A. D. (in press). Technology and aging. In R. Nickerson (Ed.), *Review of human factors and ergonomics*. Santa Monica, CA: Human Factors and Ergonomics Society.
- Sharit, J., Czaja, S. J., Perdomo, D., & Lee, C. C. (2004). A cost–benefit analysis methodology for assessing product adoption by older user populations. *Applied Ergonomics*, 35, 81–92.

Received April 11, 2005

Revision received August 15, 2005

Accepted August 29, 2005 ■