Appropriate Accommodations:

Speech Technologies and the Needs of Older Adults

Cristen Torrey

Carnegie Mellon University

Abstract

How should speech technologies converse with older adults? This paper reviews the literature on human communication directed toward the elderly and discusses the nurturance function, the comprehension function, and the control function of elderspeak with respect to both speakers and listeners. It is suggested that the impact of elderspeak varies depending on how appropriate that accommodation is to the target individual. If perceptions of communication from speech technologies are consistent with perceptions of communication from humans, appropriate accommodation is central to successful interaction. A proposal for testing this hypothesis experimentally is described. It is predicted that unnecessary accommodation will result in users who are dissatisfied and less confident in their own abilities. On the other hand, if speech technologies do not accommodate enough, then users will be less efficient and less effective in accomplishing their goals.

ASSISTIVE TECHNOLOGIES FOR SENIORS

Much has been written about the “graying” of the United States population. In the year 2000, there were approximately 35 million seniors. As the baby-boom generation reaches age 65, the number of seniors is expected to reach 70 million by 2030 (*Aging in the United States*, 1997). The needs of an elderly population double its current size, particularly the anticipated needs of those over the age of 85, has caused numerous research groups to consider ways technology may provide some of the care that will inevitably become necessary.

To a large extent, work on assistive technologies for seniors focuses on monitoring the state of the older adult in the home. Projects using various sensor technologies seek to inform family caregivers about aspects of the older adult’s health, if the adult is not eating regular meals, for example, or spending a great deal of time in bed (Haigh et al., 2003; Mynatt, Rowan, Jacobs, & Craighill, 2001). Other projects give the feedback directly to the older adult in situations where the stove has been left on or a daily medication has not been taken (Pollack et al., 2002). Monitoring technologies may ultimately be able to provide cognitive assistance for a wide range of activities. In the future, an aware home may be able to recognize that a common sequence of events has been only partially completed and begin prompting the user to complete the remaining steps. The overarching goal of this work is to support "aging in place," allowing seniors to retain their autonomy by remaining in their own homes.

As technologies become more proactive in the older adult’s home, speech interfaces will become more prevalent. Speech interfaces are a particularly appropriate choice for cognitive task assistance because they do not force the user to split their

visual attention between the task at hand and a separate physical display. The use of speech technologies is a broad and vibrant research area on its own, but as these technologies begin to interact with older adults, several interesting questions emerge. The first important question is how language should be used to effectively communicate with older adults. Do older adults have particular communication needs? How can speech technologies best converse with older users? Another important question is how the speech will be embedded in the home. Who will be doing the speaking? Will adults respond to disembodied voices in ways similar to other humans?

In order to address the first question regarding language use, this paper will review previous research on human-human communication with the elderly. Drawing on this research, a proposal will follow, addressing the applicability of the human-human communication research findings to speech technologies in the context of home health care.

HUMAN-HUMAN COMMUNICATION AND THE OLDER ADULT

Elderly conversationalists are a particular population with specific communication needs. One of the most significant findings from the literature on communication with the elderly is that adults do not speak to the elderly the way they speak to other adults. In reviewing the literature on this phenomenon, I will look first at what constitutes this difference in communication behavior. I will then consider several functions of this behavior from the perspective of both the speaker and the listener. Finally, I will review a general model of this important phenomenon.

Elements of Elderspeak

Early interest in a special speech register directed toward the elderly was labeled "baby talk" because of its similarity to communication between mothers and their infants. Indeed, certain features of the baby talk register are present in speech among intimate adults and to animals as well. There are many unique features of elderspeak communication (see Figure 1), and the defining elements vary from study to study. As the research in this area progressed, speech directed toward the elderly was termed "secondary baby talk," "elderspeak," “dependency-supportive communication” and "patronizing speech." In this paper, communication directed toward older adults will be referred to as elderspeak. The term, elderspeak, is preferable because it is a neutral term, unlike “patronizing communication." It is also distinguishable from the baby talk that occurs to infants. As we shall see, elderspeak functions differently for its speakers and is interpreted differently by its listeners than baby talk to infants.

Verbal Elements	Nonverbal Elements
Vocabulary	Voice
Simple	High pitch
Few multisyllabic words	Exaggerated intonation
Childish terms	Loud
Minimizing words (e.g. just, little, short)	Slow
Pronoun modifications (e.g. over inclusive we, exclusive we, avoidance of me/you in favor of name substitutions)	Exaggerated pronunciation
Grammar	Gaze
Simple clauses and sentences	Low eye contact
Repetitions	Staring
Tag questions	Roll eyes
Imperatives	Wink
Fillers	Proxemics
Fragments	Stand too close
Forms of address	Stand over a person seated or in bed
First names and nicknames	Stand too far off
Terms of endearment (e.g. sweetie, dearie, honey)	Facial expression
Childlike terms (e.g. good girl, naughty boy, cute little man)	Frown
Third-person reference	Exaggerated smile
Topic management	Raised eyebrows
Limited topic selection and topic reinforcement (e.g. focus on past, shallow, task oriented, or overly personal)	Gestures
Interruptions	Shake head
Dismissive of other-generated topics	Shrug shoulders
Exaggerated praise for minor accomplishments	Hands on hips
	Cross arms
	Abrupt movements
	Touch
	Pat on head
	Pat on hand, arm, shoulder

Figure 1. Elements of Elderspeak (Ryan, Hummert, & Boich, 1995)

Functions of Elderspeak

Researchers interested in the features of speech addressed to children hypothesized that baby talk to children had two primary components, a communication-clarification component and an expressive-affective component (R. Brown, 1977). When data began to be collected on baby talk addressed to the elderly, the focus on comprehension and affective goals prevailed. Later research presented the idea of control as an additional function of elderspeak (Lanceley, 1985). We will discuss the

nurturance function, the comprehension function, and the control function of elderspeak with respect to both speakers and listeners.

NURTURANCE

In a landmark study on baby talk in institutional settings, nurses' aides in a health care facility were audiotaped while working in the dining room during the lunch hour (Caporael, 1981). These samples were content-filtered and categorized on the basis of paralinguistic features alone. Roughly twenty percent of the speech gathered during this field study was reliably categorized as baby talk. In this work, baby talk is distinguished from elderspeak on the basis of prosodic features such as exaggerated intonation and high pitch. When these samples of baby talk in the institution were compared to similarly processed samples of teachers' aides in a nursery school class, college students were unable to differentiate between them. However, normal adult speech was clearly distinguished from either of the two forms of baby talk. In this study, subjects rated the baby talk register as more comforting than the adult speech register. This finding was the impetus for a line of research which investigated the nurturance component of elderspeak. In turn, we will consider the following two aspects of the nurturance component: the motivation of speakers and the impact on listeners.

Motivation of Speakers

Caregivers may see an institutionalized elderly adult in a dependent position and believe he or she needs caring attention. If this rationale for using elderspeak to convey nurturing information is accurate, one would expect that the more dependent an individual is, the more elderspeak the individual would receive. This motivation was

explored in some of Caporael's earliest work but has not been supported. Caregivers' ratings of individual care receivers did not predict the amount of baby talk they received from those same caregivers (Caporael, 1981). Instead, caregivers' composite ratings of several elderly listeners predict caregivers' beliefs about the appropriateness of elderspeak. Ratings of elderly behavior, particularly behavior in the social sphere (e.g. motivation, friendships), predicted caregivers' choice of the baby talk register as an appropriate strategy (Caporael, Lukaszewski, & Culbertson, 1983). The motivation of speakers to convey nurturing information is not specific to individual needs; it is dependent on general perceptions of the elderly population.

Impact on Listeners

The first study which suggested that baby talk was comforting did not make the subjects aware of the target of the communication, so a follow-up study asked for judgments from institutionalized elderly adults themselves. These subjects listened to the samples in pairs and were asked which voice they liked the best. As elderly adults' functional ability went down, their preference for the baby talk register went up (Caporael et al., 1983). In an institutional setting, low functional ability would be highly related to the amount of help received by the nurses' aides; it is these more dependent adults who prefer the sound of the baby talk register.

Further investigations along these lines provide evidence that contradicts the hypothesis that elders find elderspeak to be nurturing. Another judgment study using paired samples did not find the expected relationship between elderspeak and ratings of warmth (O'Connor & Rigby, 1996). This study asked subjects for ratings of two related written scenarios. The elderspeak condition included terms of endearment and childlike

terms, but the neutral-talk scenario was rated higher on the warmth dimension by both nursing home residents and community-dwelling elderly adults. It is also likely that subjects were inferring intonation from the written text. (See Ryan et al. (1995) for a discussion of the validity of written scripts.) The self-reported functional health of the participants was not associated with perceptions of warmth, except among female nursing home residents.

Asking subjects to rate two comparable scenarios may exaggerate the differences between them. Further research, using a between-subjects design, demonstrated that elderspeak does not convey nurturing affective information. Instead, it is related to more negative outcome measures (Ryan, Hamilton, & Kwong See, 1994). College students and elderly adults heard an audiotaped sample of either elderspeak or a neutral style. This elderspeak condition included a term of endearment, simpler expressions, more short imperatives and tag questions, and presumption about the resident's inability to remember to go to the dining room. Both college students and elderly adults rated users of elderspeak as less respectful and less competent; they did not rate elderspeak as more nurturing.

Conclusion

There is evidence that elderspeak carries an affective component, but there is no evidence that it unequivocally conveys nurturance. In limited circumstances, particularly where the elderly are in a highly dependent situation, it can be appealing and comforting. These adults need care; therefore, a caring tone is appropriate. Outside of this situation, particularly among community-dwelling elderly adults, this kind of tone is considered highly disrespectful. Regrettably, speakers do not appear to make this

distinction. They do not seem to use the nurturing component of elderspeak in ways that differentiate the speech target on an individual basis. The use of elderspeak is, instead, associated with general beliefs about the elderly.

COMPREHENSION

The second function of a modified register to the elderly population is language comprehension. The aging process introduces several variables which may influence the ability of seniors to communicate. First, the mechanics of speaking and listening can decline. The voices of older adults lose strength, and their hearing deteriorates. From a processing perspective, reaction times decrease and memory problems increase, specifically those associated with divided attention (Ryan, Giles, Bartolucci, & Henwood, 1986). In light of these communication difficulties, we will consider whether elderspeak functions as a comprehension modification for speakers and for listeners.

Motivation of Speakers

While elderspeak may very well improve the comprehension of older adults, there is little evidence that speakers intend to use it in this way. If elderspeak were sensitive to comprehension requirements, one would expect that manipulating the availability of feedback from the listener would influence the amount of elderspeak produced. Instead, young adults use elderspeak to partners who are permitted to interrupt (Kemper, Vandeputte, Rice, Cheung, & Gubarchuk, 1995) and to partners who are not permitted to interrupt (Kemper, Othick, Warren, Gubarchuk, & Gerhing, 1996).

An early study in an institutional setting asked nursing staff and volunteer subjects to speak to one senior they perceived to be alert and another they perceived to

be non-alert (Ashburn & Gordon, 1981). Only verbal dimensions of elderspeak were analyzed. The volunteer subjects did not speak differently to alert and non-alert seniors, and the only distinction made by the nursing staff was an increase in the number of interrogative statements to the non-alert seniors.

There is some evidence, however, that speakers will adjust their language to compensate for a serious communicative deficiency (Kemper, Ferrell, Harden, Finter-Urczyk, & Billington, 1998). Subjects were told that the target of their communication was cognitively impaired and suffered from memory lapses, disorientation, and failed to recognize family members. Both young and older adults reduced sentence length and the propositional density of their communication when they targeted their messages to the cognitively impaired. The young adults compensated even more and produced more checks, expansions, and repetitions in their messages.

Impact on Listeners

Older adults who are paired with a young adult using elderspeak perform better on a referential communication task than when they are paired with a peer. However, these same older adults report more problems with their own communicative competence (Kemper et al., 1996; Kemper et al., 1995). Interestingly, the self-reported communication problems of the older partner are not reported by the younger partner. Subsequent work on the comprehension function of elderspeak explores which aspects of elderspeak may assist comprehension and seeks to discover which aspects predict a decline in the listener's self-confidence.

Improving Comprehension

An experiment using a map task as a referential communication task created instruction in two conditions. One condition used directions that were simplified by shortening sentence length; the other condition used directions that eliminated embedded clauses. Shortening sentence length did not improve comprehension but did increase subjects self-reported communication problems. Eliminating embedded clauses, which simplifies syntactic complexity, improved comprehension and decreased communication problems (Kemper & Harden, 1999). In a separate experiment, repetitions or elaborations of roughly half the instruction steps helped older adults perform as well as their young adult counterparts (Kemper & Harden, 1999).

A widely acknowledged element of baby talk is intonation. In order to investigate whether this feature serves a function in comprehension, young adults and older adults listened to an audiotape of a newspaper story being read aloud. The audiotape was manipulated to feature significant stress on the relevant nouns and verbs or in the alternate condition, stress on irrelevant aspects of the sentence (such as prepositions). Relevant stress improves comprehension for older adults; misplaced stress decreases comprehension for older adults. But the comprehension of the young is unaffected (Cohen & Faulkner, 1986).

Undermining Confidence

The previously described results showed a benefit for older adults given speech with appropriately placed stress, but the use of intonation in elderspeak is often considered exaggerated, not merely appropriate. One experiment manipulated the prosodic register of elderspeak independently of its verbal features. The exaggerated

prosody condition included stress on key words, a slow rate of speaking, pauses, and clear enunciation. The effect of this manipulation was a slight decrease in performance as well as a significant increase in self-reported communication problems (Kemper & Harden, 1999).

Conclusion

There is evidence that certain features of elderspeak improve comprehension, specifically syntactic simplification and semantic elaboration. But these beneficial features of elderspeak are often accompanied by elements which do not appear to improve performance. It is these unnecessary features of elderspeak which seem to imply that the listener is incompetent. Listeners respond to this by believing that they are less communicatively competent than they actually are. Unfortunately, speakers do not appear to regulate their speech to the specific requirements of their listeners. Consequently, elderspeak may be doing as much harm as good.

CONTROL

Certain features of the elderspeak register do not clearly serve a caring or a comprehension function. It has been argued that features such as the inclusive we ("up we go"), tag questions, third person references, etc. signal a demonstration of the power dynamic between nurses and the institutionalized elderly (Lanceley, 1985). Negative evaluations of elderspeak are consistently produced, but there is no evidence that the detrimental effects of elderspeak are deliberate. Considering the balance between managing relationship goals (associated with the care dimension) and managing task

goals (associated with the control dimension), may shed some light on how elderspeak is produced and evaluated (Hummert & Ryan, 1996).

Motivation of Speakers

Speakers manage concerns related to relationships and tasks with all manner of different listeners. Decades of work on politeness theory have described the balance between maintaining positive face (protecting individual worth) and maintaining negative face (protecting autonomy) when conversing with anyone (P. Brown & Levinson, 1987). But the situation becomes more complicated with an older adult who may require the maintenance of a third dimension, security (Parmelee & Lawton, 1990). One possibility is that the interaction between these three goals is challenging and impolite conversation is the result. (Figure 2 shows several other outcomes of mismanaged goals.)

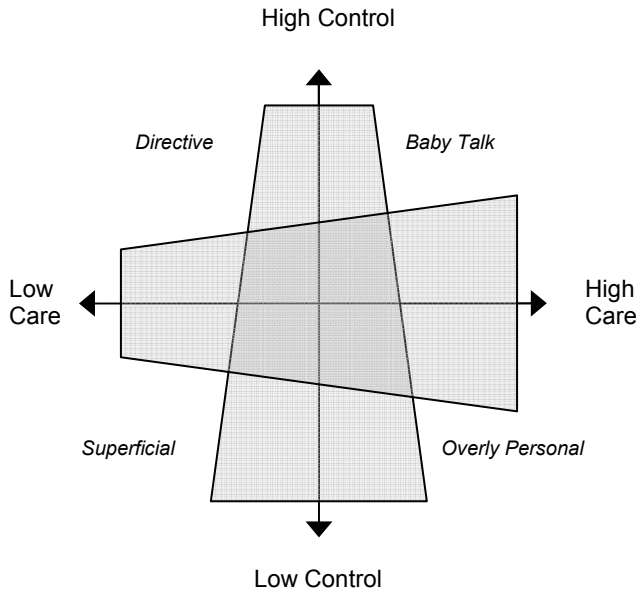

Figure 2. Model of Patronizing Talk (Hummert & Ryan, 1996) (Shaded areas of the model represent polite talk.)

For example, caregivers who visit the homes of older adults will cite autonomy goals for their clients more frequently than caregivers in institutions. Caregivers in institutions will cite security goals more frequently. However, the verbal and physical behavior of these two groups of caregivers is almost identical (Wahl, 1991). While engaging with older adults as "helpers," it appears to be difficult for speakers to optimize for autonomy as well.

Impact on Listeners

In order to explore possible differences in the value and experience of independence among older adults, several observational studies were conducted among nursing home residents and older adults who received assistance with self-care from their home. Verbal as well as behavioral data was coded for either control by the older adult, control by the staff, or cooperation. The results show that dependent behaviors result in immediate, positive reactions, while independent behaviors are ignored or, often, receive dependence-supportive responses (Baltes & Wahl, 1996). One example of a dependence-supportive responsive might be "I told you not to do that; you always get it wrong." In fact, in one study, independent behaviors are followed twice as often by dependence-supportive responses as independence-supportive responses (Baltes & Wahl, 1992).

A byproduct of dependence-support scripts is the nonuse of competence by older adults. This occurs when an older adult has the ability to do something but receives help anyway. These studies also investigated the causal explanations for this surrender of responsibility. Perhaps not surprisingly, the elderly see their inactivity as the result of

staff's behavior, while the staff see the elderly person's inactivity as the result of the elderly person's characteristics (Wahl, 1991).

Conclusion

Of course, few would acknowledge that they were seeking to undermine an individual's autonomy with their speech. It may simply be, however, that seeking to simultaneously provide care, to provide security, and to facilitate autonomy is a tall order in any given conversation. Further, paid caregivers may see themselves as helpers; that is what they are paid to do. While it is unnecessary for caregivers to assume that a limited need for help implies that older adults can do nothing for themselves, there is no incentive for professional caregivers to attend to the varied skill levels of their different clients in order to ensure that each senior maintains as much personal control as possible.

THE COMMUNICATION PREDICAMENT OF AGING MODEL

The impact of the three functions of elderspeak varies depending on how appropriate that accommodation is to the target individual. But for each of the three functions, speakers do not appear to be moderating their use of elderspeak in ways that benefit older adults. Instead, speakers seem to be accommodating their use of elderspeak to nurture, to aid comprehension, and to control for an entire population. The idea that speakers are accommodating to a stereotype of aging, as opposed to the needs of a specific listener is termed the communicative predicament of aging (Ryan et al., 1986). This model claims that the motivation of the speaker is an aging stereotype, and the impact on the listener is the acceptance of that stereotype as a self-stereotype.

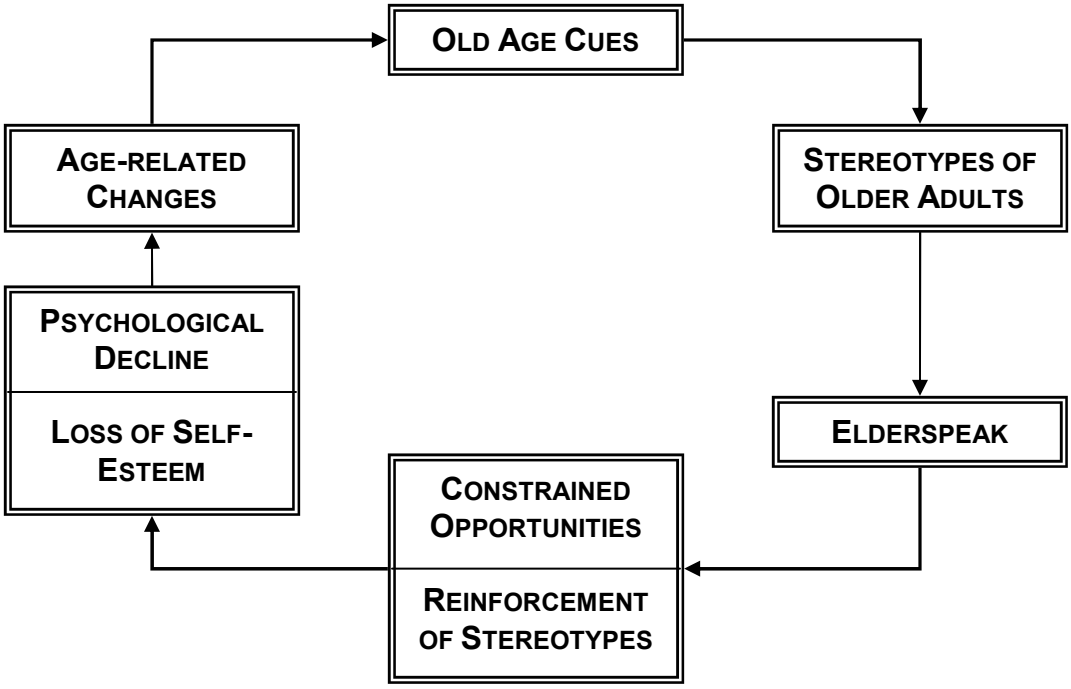

Figure 3. The Communication Predicament of Aging (Ryan et al., 1986)

Motivation of Speakers

Stereotypes can be exposed by a variety of different techniques -- trait sorting, implicit association tests, matched-guise technique, etc. (Hummert, Garstka, Ryan, & Bonnesen, 2004). In a matched-guise study, an actor taped the same passage using a "young" and an "old" voice. Subjects who heard the "old" voice estimated the speaker to be around sixty-two years old. The presumed age of the speaker led subjects to interpret the passage in different ways. The "old" voice was assumed to be confused when saying "I don't know what to think" while the "young" voice was assumed to withholding judgment (Giles, Coupland, Coupland, Williams, & Nussbaum, 1992). When subjects were asked to question the writer of the passage, subjects included more

questions about health, physical condition, quickness of reaction, and mental competence to the older target (Giles et al., 1992).

In a study specifically designed to measure beliefs about communication with older adults, subjects rated themselves on the Language in Adulthood Questionnaire and another adult aged either 25 or 75 years old (Ryan, Kwong See, Meneer, & Trovato, 1992). Respondents expected fewer communication problems from 25-year-olds on every item, except for telling enjoyable stories and sincerity while talking.

Impact on Listeners

When elderspeak cues a negative aging stereotype, older adults are vulnerable to accepting this stereotype. For example, when older adults are addressed with elderspeak by young adults, they give lower assessments of their own communication abilities even when these communication problems do not exist (Kemper & Harden, 1999). Even more distressing, stereotypes can have an expectation effect. Even subliminal priming of negative age stereotypes (words like senile, decrepit) can produce surprising effects. Levy and colleagues have reported the detrimental effects of self-stereotyping for memory, handwriting, even walking (Levy, 2003). Negative age stereotypes have no effect on young people because it is thought that these stereotypes are not yet salient, but older adults have internalized and are fearful of these negative aging stereotypes. For example, older subjects evaluate a forgetful older target more negatively than younger and middle-aged subjects (Rodin & Langer, 1980). These internalized stereotypes make older adults susceptible to self-stereotyping.

PROPOSED RESEARCH

Looking across the reviewed research, the perception of negativity in elderspeak is frequently related to the idea of unnecessary accommodation. Elderspeak may be nurturing to those in a serious state of decline, but it is offensive to those in good health. It aids comprehension when it includes useful elaborations but becomes insulting when it includes features that are not useful for performance, such as pauses and short sentences. And although, in some cases, seniors need to relinquish a limited amount of control over their lives to their caregivers, elderspeak may become damaging when control is asserted uniformly. Unnecessary accommodations may be the result of stereotypes, which are of limited usefulness to the speaker but can be detrimental when the listener begins to accept these stereotypes as reality.

This review suggests that speech technologies should approach communication with older adults sensitively. If perceptions of communication from speech technologies are consistent with perceptions of communication from humans, then unnecessary accommodation will result in users who are dissatisfied and less confident of their own abilities. On the other hand, if speech technologies do not accommodate enough, then users may not be able to achieve their goals. The following proposed experiment tests the hypothesis that older adults will respond to speech technologies in ways similar to other humans. If the hypothesis is confirmed, further research could clarify the specific nature of appropriate adjustment, thus improving communication between older users and assistive technologies.

Experimental Domain

A large number of people take an active role in monitoring their health conditions from home. It is crucial that tasks within the home health care domain are managed effectively as the consequences of errors can be high. Yet, it is also important that these tasks be handled sensitively. Attending to one's health is a basic, ongoing need, and health related tasks carry a high emotional significance. This proposed experiment will use a task associated with the glucose monitoring activities engaged in by diabetics (see figure 4). By checking their blood sugar levels regularly, patients can manage their diabetes by adjusting diet, exercise, and insulin.

Figure 4. A Typical Glucometer

Recent research has shown, however, that despite large numbers of elderly diabetes patients, glucometers are not designed with the elderly patient in mind (Rogers, Mykityshyn, Campbell, & Fisk, 2001). Many glucometers must be calibrated periodically. The task of calibration involves checking the glucose level of a control solution in order to make sure the meter is working properly. Infrequent tasks are disproportionately hard on older users as the retention time affects the old far more than the young (Mykityshyn, Fisk, & Rogers, 2002). The task is also sequential. If the user

misses a step there is no way to back up; one must simply start over. And there is little feedback from the system about which steps have been completed. Activities with multiple, sequential steps are more difficult for older users because there seems to be an age-related decline in working memory capacity (Mead, Lamson, & Rogers, 2002). In a study which tracked 90 patients using glucose meters for one month, 62% of the patients made at least one “clinically significant” error (Colagiuri, Colagiuri, Jones, & Moses, 1990). Because calibrating a glucose meter is such an important yet difficult task, it is a good candidate for assistive speech technology.

Experimental Conditions

For this experiment, I will develop a glucose meter simulation which will run on a laptop computer. The simulation will accept input from the user via physical manipulation (i.e. clicking a button) and via speech input. There will be two communication strategies. In the directive strategy condition, the system will take the dialogue initiative by instructing each and every step in the task. The system will check for comprehension and will not move on until the step has been correctly completed. In the responsive strategy condition, the system will force the user to take the initiative, but the system will respond to any requests for reminders.

Experimental Procedure

Community-dwelling adults over the age of 55 will be enrolled in the study if they do not currently monitor their blood sugar with a glucose meter. A pre-manipulation assessment of general skill will be administered before the start of the experiment. This measure will be obtained from the subjects’ performance on a simulated thermostat

task. After receiving video-based training, subjects will be asked to program the simulated thermostat for a given weekly schedule. The simulated thermostat will have a “help” button which will provide some guidance, so in addition to getting some general proficiency information about the subject, this pre-test also obtains some measure of preference for user vs. system control.

Following the thermostat task, subjects will receive the video training for the glucose meter task. Then, they will complete the glucose meter calibration task every seven days for a month. After the final calibration task, subjects will attempt the thermostat task for a second time and complete a questionnaire. The questionnaire will include scales for self-reported communicative and task competence, as well as task difficulty and satisfaction measures.

Predictions

If older adults perceive the communications of a home health device as they would a human, then skilled users will be less satisfied with the directive system. They will report more communication problems and less confidence for the task. Conversely, unskilled users will be less satisfied with the responsive system. They will report greater task difficulty and lower task competence. The most successful conditions will be well matched – the skilled users with the responsive system and the unskilled users with the directive system. This is the kind of successful accommodation that would be predicted by the research in human-human communication.

Future Work

Regardless of the outcome of this experiment, many questions will remain. If adjustment is indeed necessary, should instruction be adapted continuously and for each step? Or should instruction be evaluated periodically and reflect a general stage of competence (i.e. the user is an expert or a novice)? Should these devices seek to develop user as opposed to system control? Or should they be primarily concerned with task efficiency and performance?

If people do not respond to speech technologies in ways that are similar to the ways they respond to people, it will be interesting to explore the characteristics which differentiate this response. If people do not believe that the device has the ability to "know" who they are (and that they are old), then the accommodations of the device do not carry the significance of human accommodation. But what if a device was labeled a "special older adult version"? Would the instruction then have the potential to become patronizing?

Finally, simple electronic devices are just a first step in human-machine communication. When robots become a viable presence in the home, what characteristics will speech technologies embedded in humanlike forms have? Similarly, when technological devices have more intelligence and a greater ability for assessment, do they have more potential to offend our self-perceptions?

Conclusion

There is a lot for humans to process during any given conversation, and it seems inevitable that certain, even beneficial, accommodations cannot always be managed.

This presents an opportunity for speech technologies to converse in ways that may not be possible for humans. This paper has reviewed the relevant literature on communication to older adults and found that although there are elements of elderspeak that do benefit its listeners, its speakers do not utilize the appropriate elements to the appropriate people at the appropriate times. The research proposed here is the first step in developing speech technologies for older adults by addressing the question of whether the same perceptions of elderspeak features still apply when they are being used by a machine instead of a human. If this hypothesis is correct, we can begin to develop speech technologies which give care to the right people, support comprehension in the right ways, and give people control at the right times. Appropriate accommodation to the needs of older adults can improve quality of life in the later years.

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