

## CLINICAL INVESTIGATION

# A TRAINING PROGRAM DESIGNED TO IMPROVE THE SPEECH INTELLIGIBILITY OF PERSONS WHO INTERACT FREQUENTLY WITH ELDERLY INDIVIDUALS WHO HAVE A HEARING LOSS: EVALUATION OF THE EFFICACY OF THE PROGRAM

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**Background:** Recognizing that a conversation is an interactive process that requires the participation and the co-operation of all persons who are involved in this form of communication, there have been efforts to include communication partners in rehabilitation programs designed for persons with a hearing loss. One form of intervention designed for communication partners is to train them to improve their *speech intelligibility*, by using *clear speech* when they interact with persons who have a hearing loss. The present study was designed to evaluate the efficacy of a training program that taught communication partners how to produce clear speech.

**Methods:** Two cohorts of participants (i.e. frequent communication partners) took part in the investigation. One cohort comprised the control group. The participants in this group received no information or training on how to produce clear speech. They were simply requested to produce iterations of clear speech on two occasions that were held 1 month apart. The participants in the experimental group produced iterations of clear speech on three different occasions: 1) before they completed a training program designed to teach them how to produce intelligible clear speech, 2) immediately after they completed the training program, and 3) 1 month after the training session.

**Results:** Preliminary results suggest that the training program was successful in improving the speech intelligibility of persons who frequently interact with individuals who have a hearing loss.

**Conclusions:** An information session that includes a description of the effects of hearing loss on speech communication accompanied by information on the potential benefits of using clear speech as well as a description of the characteristics and the components of clear speech, may be sufficient to significantly improve a frequent communication partner's speech intelligibility.

**Key words:** Speech communication, speech understanding, hearing loss, elderly, speech intelligibility, clear speech

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## INTRODUCTION

Statistics from Health Canada indicate that approximately 20% of the population  $\geq 65$  years of age have a significant hearing loss. For individuals  $\geq 75$ , the incidence of hearing loss is 40%.<sup>1</sup> Among the most deleterious effects of hearing loss among elderly individuals is the fact that they experience problems during speech communication. This is due in part because they are unable to hear all of the speech sounds, the sounds that they do perceive are often distorted, and they are more susceptible to the effects of noise on speech perception.

The consequences of hearing loss among elderly individuals can be dramatic. Hearing loss has been shown to cause social isolation, which in turn can lead to psychological, social, or emotional maladjustment or distress. In some cases, the presence of hearing loss can lead to clinical depression. Although few data are available, there are indications that among elderly individuals, the presence of hearing loss can have an impact on their ability to live autonomously in their own residence.

There exists several different forms of intervention programs intended to overcome the problems reported by elderly individuals who have a hearing loss. By far the most common form of treatment recommended for a permanent sensorineural hearing loss is the use of hearing aids. It is estimated that almost 90% of Canadian adults who have a hearing loss own at least one hearing aid.<sup>1</sup> However, the proportion of elderly individuals who own a hearing aid is considerably less than that. In addition, many elderly persons who own a hearing

aid do not use it regularly. The use of hearing aids can improve speech understanding in some situations. However, under some circumstances, even technologically-sophisticated hearings aids may not be sufficient to overcome the speech understanding difficulties experienced by many persons with a hearing loss. This is especially the case when conversations take place in noisy and reverberant environments. There exist some assistive devices that can be used to improve speech understanding under unfavourable listening conditions. Notwithstanding the benefits provided by technological aids, there is a need to develop complementary and alternative intervention programs for elderly persons who experience speech communication problems.

Speech communication, which can be broadly defined as *an exchange of information between individuals*, minimally involves the participation of at least two persons. A conversation is an interactive process that requires the participation and the cooperation of all the persons who are involved in this form of communication.<sup>2,3</sup> A communication breakdown occurs when there is a temporary interruption in the flow of information that is transmitted among individuals who are involved in a conversation. Their inability to understand speech flawlessly constitutes an important reason for the communication breakdowns that occur when elderly persons with a hearing loss interact with frequent communication partners, such as their spouse, children, relatives, friends, and colleagues. Speech interactions that are characterized by frequent communication breakdowns are not very satisfying for all the persons involved in the conversation. In recent years, some intervention programs involving elderly individuals with a hearing loss have focused on teaching strategies designed to minimize the occurrence of communication breakdowns, or quickly restore conversational fluency when a breakdown does occur.<sup>2,4</sup> These types of intervention programs recognize the important role of all communication partners in optimizing speech communication. Also, they imply that persons with a hearing loss as well as their frequent communication partners should participate in intervention programs designed to optimize speech communication.

A person's *speech intelligibility* refers to how easy (or difficult) it is to understand that person's speech. For example, the speech of persons who have a strong foreign accent or persons who do not articulate very much when they speak is difficult to

understand. Those persons are deemed to display poor speech intelligibility. On the other hand, the speech of actors and persons who host television and radio programs is usually highly intelligible. Moreover, a person's speech intelligibility can vary according to the requirements of a conversation or according to the communication setting. For example, individuals tend to speak more clearly when they are less familiar with their communication partners or when they have to speak in more formal settings. The same person may speak more casually when they interact with persons with whom they are quite familiar (e.g. a frequent communication partner). In general, *clear speech* is more intelligible than *conversational-like speech*.

Clear speech is a speaking style adopted by talkers in an attempt to improve their speech intelligibility in difficult communication situations.<sup>5</sup> Investigators have compared speech intelligibility of individuals under different experimental conditions. Generally, in those investigations, a talker is asked to produce some sentences while using conversational-like (*casual*) speech and while using clear speech. The results of several studies show that, on average, an individual's iterations of clear speech is approximately 15-20% more intelligible than his or her iterations of conversation-like speech.<sup>5-13</sup> These findings indicate that when a person uses clear speech, his or her communication partners are likely to understand 15-20% more of the information that is being communicated than when the same person uses conversational-like speech. Also, the literature indicates that there is a large amount of inter-talker variability in intelligibility of clear speech communication.<sup>6-8</sup> For example, when they are requested to speak clearly, some persons are unable to modify their speech articulation patterns in a manner that improves their speech intelligibility, relative to their intelligibility for conversational-like speech. Other talkers can improve their speech intelligibility by more than 30% when they use clear speech rather than conversational-like speech.

These findings have applications for intervention programs designed to improve speech communication. Specifically, they suggest that one way to facilitate speech communication between a dyad of persons that includes an individual with a hearing loss, may be for the frequent communication partner to use clear speech rather conversation-like speech. Further, because not all individuals can

inherently produce clear speech that is highly intelligible, it is possible that some persons may benefit from training on how to produce speech patterns that improve speech intelligibility.

In one study, the speech intelligibility of individuals was measured before and after they completed a training program designed to improve their speech intelligibility for iterations of clear speech.<sup>12</sup> The results of the study revealed that the participants displayed significant improvements in their speech intelligibility after they had completed the training program. Based on those results, Schum<sup>13</sup> proposed an intervention program designed to improve the speech intelligibility for frequent communication partners; the components of the training program are described in the Methods section below. The present study constitutes an extension of the work of Schum.<sup>13</sup> Specifically, the purpose was to identify which component of the training program proposed by Schum contributed the most to improving the speech intelligibility of the participants.

## **METHODS**

### **Subjects**

Twelve frequent communication partners of persons with a hearing loss were recruited. Half of the participants (n=12) were assigned to the experimental group who completed the training program. The other participants constituted the control group.

### **The Training Program**

The training program used was similar to the one described by Schum,<sup>13</sup> and was provided individually to the members of the experimental group. It consisted of two major components.

The first component, approximately 20 minutes in duration, consisted of providing the communication partner with some information on the effects of hearing loss on speech understanding and on the influential role that communication partners can play during a conversation with a person who has a hearing loss. Clear speech was defined, the potential beneficial effects of clear speech on one's speech understanding abilities were explained, and the characteristics of clear speech were presented to the participant.

During the second component, the Experimenter produced exemplars of highly intelligible speech in order to demonstrate the various characteristics of

clear speech. Then, the participant was given the opportunity to practice producing specific articulation patterns that are characteristic of clear speech. During that part of the training program, which was approximately 20-30 minutes in duration, the participant received feedback on his or her performance.

### **Measures of Speech Intelligibility**

Each participant was recorded while he or she produced iterations of speech under different experimental conditions. The participants in the experimental group provided speech iterations under 5 different conditions: 1) while requested to use conversational-like speech, before the training program was initiated; 2) while requested to use clear speech, before the training program was initiated (i.e. without any information on what constitutes clear speech); 3) while requested to use clear speech, immediately after they completed the first component of the training program; 4) while requested to use clear speech, immediately after they completed the second component of the training program; 5) while requested to use clear speech, 1 month after the training program was completed.

The members of the control group were recorded while they produced speech iterations under three different conditions: 1) while requested to use conversational-like speech, during the first session; 2) while requested to use clear speech (i.e. without any information or training on what constitutes clear speech), during the first session; and 3) while requested to use clear speech 1 month after the initial session. The sentences obtained from the participants were edited and presented, in a random order, to a group of subjects. The subjects had to write-down the key-words in each of the sentences. The performances of the subjects on the perceptual task were used to quantify the speech intelligibility of each frequent communication partner, under each of the experimental conditions.

## **RESULTS**

The preliminary results indicate: 1) Some but not all of the frequent communication partners were able to improve their speech intelligibility based on a simple request to speak clearly; 2) The most significant improvement in speech intelligibility (10-15%) were observed from the recordings obtained immediately after the first component of the train-

ing program, which consisted of explaining to the participants the effects of hearing loss on speech understanding as well as describing the characteristics and the components of clear speech; 3) The second component of the training program, which consisted of the Experimenter modelling clear speech and providing the participant with the opportunity to produce iterations of clear speech, resulted only in modest improvements in speech intelligibility; and 4) The improvements in speech intelligibility observed among the persons who completed the training program were sustained over a period of 1 month.

## CONCLUSIONS

In the present study, the efficacy of a training program designed to improve the speech intelligibility of frequent communication partners was evaluated. The preliminary results suggest that an information session that includes a description of the effects of hearing loss on speech communication, accompanied by information on the potential benefits of using clear speech as well as a description of the characteristics and the components of clear speech, may be sufficient to significantly improve a frequent communication partner's speech intelligibility.

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