

Computer Work and Speech Recognition

Summary 2002

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Summary

This report presents the results from a research project, where twenty participants from four Danish companies have had the opportunity to use speech recognition for about half a year as a supplement to computer mouse and keyboard during computer work. It is the hope that the use of speech recognition can reduce the adverse effects of computer work on the musculoskeletal system without creating new problems.

The research project had the following goals:

- to investigate technical/organizational challenges related to the introduction and use of speech recognition
- to investigate which workplace functions benefit mostly from using speech recognition, and to show any consequences in the organization of computer work
- to investigate whether the introduction of speech recognition in connection with computer work can reduce the static muscle activity and result in more micro pauses in the shoulder and the arm muscles thus creating increased opportunities for variation in working positions
- to investigate the vocal strain as a result of using speech recognition.

Before and after the intervention where the participants were introduced to speech recognition, the work organization and workplace functions, the muscle workload and the voice usage of the participants were examined. During the intervention the participants' use of mouse and keyboard was registered, and midterm interviews were conducted with respect to the participants' learning ability and use of speech recognition. Twenty participants started on the project in autumn 2000. Ten participants carried out the project and were studied in early summer 2001. The ten participants made use of speech recognition during normal working conditions for an average of 11% of the work hours.

The technical/organizational investigation shows that speech recognition software in the current version is no "off-the-shelf product" that can be expected to be easily installed. To get full benefit from speech recognition, qualifications such as motivation, user cooperation and efficient support are needed. The investigation also shows that speech recognition has difficulties in competing with existing technologies (mouse and keyboard), unless speech recognition presents considerable improvements for the users, especially in situations where the users have many urgent work tasks without having the needed extra time that is required to learn a new tool. General recommendations related to the introduction of speech recognition are presented in the report based on the project results.

The investigation of the work organization shows that speech recognition can give participants with much computer work more variation and more challenges in their work. Speech recognition can be used to change the working method at the screen and thus give the participants a feeling of being relieved. It is precisely the group of participants with much computer work who continues to use speech recognition, because they can see the opportunities and the benefits by using speech recognition. Whereas the participants with less computer work and a larger variation in work tasks to a larger degree perceive the speech recognition software as a limitation and consequently stop using speech recognition.

The investigation of work physiology shows that the use of speech recognition reduces the activity in the forearm and the neck and to some degree the activity in the shoulder. The results indicate that the use of speech recognition shows tendencies to a longer gap time in the forearm and the shoulder. On the other hand it shows an increased muscle activity and a shorter gap time in the speech related muscles. This could indicate a risk of over loading the speech related muscles if speech recognition software is used intensively. Registrations of the work postures show that the use of speech recognition caused a shorter duration where the hand was 'locked' to the keyboard/mouse, but a longer duration where the eyes were 'locked' to the screen.

The investigation of the participants' voice function before and after the intervention shows changes in the voice function that are probably due to the use of speech recognition. About fifty percent of the participants that carried out the project have had subjective vocal discomfort. These problems are considered to be mild, but both video stroboscopy and acoustic analyses of the voice showed signs of initial vocal fatigue – also among the participants that had not yet experienced subjective vocal problems. The changes of the voice function could result from excessive muscle tension that could lead to e.g. globulus, dryness and clearing of the throat, but it can be prevented if users of speech recognition complete a basic course in voice training.

Based on the research it is concluded to recommend speech recognition as a supplement to computer mouse and keyboard with the reservations stated above.