Chapter 6

The Impact of Gaze Controlled Technology on Quality of Life

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ABSTRACT

This chapter presents the process of introducing an eye tracking device to impaired users. It reports results from a gaze control user trial conducted with people for whom gaze control is a necessity due to their current condition or for whom it will soon become a necessity because of a progressive disease. Special attention is paid to the impact of this new communication method on their quality of life.

INTRODUCTION

This chapter reports results from a gaze control user trial conducted with people for whom gaze control is a necessity due to their current condition or for whom it will soon become a necessity because of a progressive disease. Special attention is paid to the impact of this new communication method on their quality of life.

The eye tracking trials in Torino were conducted by the Department of Computer Science of Politecnico di Torino in collaboration with the Department of Neuroscience at the Hospital San Giovanni ‘Le Molinette’. The trials were conducted in two stages: in the first stage we tested the Erica eye tracker with amyotrophic lateral sclerosis (ALS) patients using a well-established protocol. In the second phase, still ongoing, we have extended our trials to include other kinds of patients, aiming to collect more qualitative

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The hospital San Giovanni Battista ‘Le Molinette’ in Turin, Italy, hosts the largest specialized ALS center in Italy. The ALS Center comprises a multi-disciplinary team of doctors, speech and language therapists and psychologists. They support approximately three hundred patients with varying stages of ALS. The first phase of the trial took place over a span of 2 years on a significant proportion of Italian ALS patients.

The objective of the trials was to evaluate if and when eye tracking technologies had a positive impact on ALS patients’ lives. The emphasis was on the overall quality of life (actual and perceived) and, for this reason; we adopted well-recognized Quality of Life assessment scales (described below) in our study. To have a realistic representation of user satisfaction, we decided to run the trials with off-the-shelf eye-tracking devices and software, so that our results would be repeatable in other environments.

ALS patients have severe mobility impairments, being often confined to bed and dependent on several medical devices. To ease their participation in the trials, as well as to remove a potentially dangerous stress factor, all of the trials were based within each patient’s domestic home environment.

Each patient was given the opportunity to use an eyetracking system for several consecutive days (1 or 2 weeks) in order to get accustomed to it and to compensate for the somewhat difficult impact of the first setup. He/she could use the eye tracker in his/her own domestic environment, choosing when to use the system and for which activities.

**Methodology**

The patients were selected and supported by a 4 person multi-disciplinary team. The team was composed of a neurologist, a psychologist, a speech and language therapist and a computer engineer. The neurologist was primarily involved in selecting the patients and assessing their ability to participate in the trial according to the criteria presented below. The psychologist evaluated the quality of life of the patients throughout the trial and assisted them in the process of accepting the aid and including it in their understanding of their extended abilities. The speech and language therapist trained the patients in the use of the eye tracking device and in related applications. The computer engineer, finally, provided technical support and troubleshooting.

Three contacts were organized during the lending period: an initial contact for basic training in the use of the eye tracker and for a baseline evaluation of the patient’s conditions; a mid-period check to reassure the patient that the team was following their progress and to solve potential problems; and a final evaluation of the patient at the end of the trial.

Patients were selected among the whole population of ALS patients in the North-Western regions of Italy (namely, Piemonte, Lombardia, Valle d’Aosta) according to public, transparent and ethically approved recruitment criteria. In particular, the criteria were:

- The patient was unable to speak intelligibly. This included patients without speaking ability or patients who were about to lose this ability. This criterion was applied to ensure suitable patient motivation for participation in the study.
- The patient was able to understand the aim of the study. In particular, he or she should understand that the eye tracker would be taken away after 1-2 weeks, that his/her quality of life will be monitored during the