

# Integrating Speech and Nonspeech Sounds in Interfaces for Blind Users

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Synthetic speech is widely used by blind people to enable them to receive textual output from computer systems. Used appropriately, speech provides a reasonably high level of access to command-line systems such as DOS and Unix, and forms the basis of many attempts to adapt graphical user interfaces. However, while current speech adaptations succeed in providing a basic level of access to textual computer output, they do not provide blind users with the same level of usability enjoyed by sighted people using a visual display.

In considering this problem, the literature concerning speech perception and human-computer interaction was reviewed and a number of issues identified which might be expected to cause problems when visually-presented text is converted into synthetic speech. In particular, it was noted that the quantity and structure of much textual computer output is inappropriate for speech presentation and may be expected to place an undue load on the user's memory. This load might be reduced by better structuring of the speech output and by using non-speech sounds where appropriate to replace some of the speech.

A study was conducted in order to investigate these issues. An existing software application was adapted through a standard commercial speech synthesis system, and groups of blind and sighted computer users were asked to perform certain tasks using the software. Their performance at the tasks was monitored and their impressions of the difficulty of the tasks were recorded.

The results support the view that the quantity and structure of the original text was unsuitable for speech presentation. Subjects identified a number of ways in which the presentation might have been improved, either by better structuring of the speech or by replacing it with non-speech sounds. Further work is proposed to evaluate these comments and produce a set of guidelines for the design of speech-based interfaces for blind users.