Voice Recognition and Dyslexia *Brief Notes .....*

Voice recognition has great potential for assisting dyslexic people to improve their writing. There are a number of different speech systems available and it is important to choose a system to match the individual's needs. The major differences between the systems are:

- correct as you go vs. deferred correction
- the use of prediction in correction dialogues
- discrete vs. continuous speech

Here are a few areas to consider:

Discrete vs. natural (continuous) speech

Learning to speak with pauses between words can be hard work. "It. is. difficult. at. first. to. remember. not. to. join. words. together." In comparison continuous speech is much more natural. However, even with continuous speech it is important to have a consistent style of speaking. i.e. a good pace, slightly "flatter" (in emphasis) and one where each syllable is spoken. Although not as difficult, it will still take some time to practice and develop a good continuous speech dictating style.

How you think

Composing information by voice is a skill in itself. Some people will work better on a word by word basis others will be more comfortable with phrase/sentence/paragraph based recognition.

When using continuous speech systems it is helpful to speak out complete phrases in one go. In one sense the individual needs to work on a phrase in their head and then once it is formed to speak it out. By working in this way it is possible to maintain a good and consistent rate and manner of speaking.

Even when using voice recognition some people may benefit from written notes, mind maps (spider diagrams) to organise their thoughts before speaking.

When considering whether speech recognition is a sensible option think about current dictation skills. Find out whether, for example, the user has used a Dictaphone before or whether they have worked amanuensis. These sort of skills would give a "head start". If not the user may well need additional support with "thinking out loud" as they start to use voice recognition.

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Proof reading and Correction

All of the available systems match what you say with a large vocabulary of correctly spelled words. Each word will always be correctly spelled, but it could easily be the *wrong* word. The important task for the user is to be able to identify these misrecognitions and to make corrections. In many instances voice recognition errors can look very similar in shape to the word you wanted (eg: modern and modem, button and bottom).

The first step is to be able to spot if the word is wrong. The next step is to correct it. The correction process in all of the voice systems involves choosing from a list of potential words. Here it is important for the user to be able to make the right choice. To gauge the difficulty of this "choosing" task I often ask people how they fare with a spellchecker. If they cannot choose the right word in a spellchecker then the task will be more difficult and the user may need additional support in terms of a facility to hear the suggested words.

Correct as you go systems: Dragon, Kurzweil: can make the task of proof-reading easier because you concentrate on a word at a time, you do not have to go back and reread text in an attempt to remember what you said and identify mistakes. The downside is that this method can impair fluency. The user could easily forget how they started the sentence and make grammatical errors as a result. Another factor is that the process requires concentration. The user needs to think about the accuracy at the same time as constructing the sentence.

Deferred correction systems, ViaVoice, NaturallySpeaking, FreeSpeech, Voice Xpress: These can give better fluency. You can speak out complete sentences and thought blocks before considering proof reading. But mistakes may be more difficult to spot in a document. (This is often an issue for non-dyslexic people!).

Proof-reading can be helped by *text-to-speech* features which allow you to listen to what is on the screen using a synthetic voice. This feature is in ViaVoice, Dragon Classic 3, NaturallySpeaking Preferred/Professional, Voice Xpress and FreeSpeech. It is available as an add on to work with Kurzweil VoicePlus.

These speech facilities allow you to select portions of text and listen to them. This type of read back is not necessarily so useful with systems requiring immediate correction. In these cases additional programs could be needed which echo and spell each word as it is dictated.

It is important to have a disciplined approach to making corrections. For some people this may involve listening to the recorded text line by line, correcting mistakes on one line before moving to the next.

A further problem with proof reading is that it is easy to forget what you said. This is especially true in situations where the voice product misrecognises several words together. ViaVoice and NaturallySpeaking Preferred and

Professional keep a recording of what you actually said. You can play this back in sections or hear what was said as you make a correction.

"Predictive" Correction

During correction there will be occasions where the word required is not in the list of suggestions. In these cases the user needs to spell in the word letter by letter. This is true of both continuous and discrete voice products. Some systems will update the correction list to show new words starting with these letters. This can assist spelling - the user usually only needs to type in the first few letters before the desired word is shown - once shown it can be selected. This will reduce problems when spelling out longer words. It can also act as a guide to have another go at the start of the word. For example if "immediately" is misrecognised and I start spelling out "eme" the word will not appear. If I go back and try "im" the word I require should be shown.

Even with the support of "predictive correction" there will always be instances where the user gets "stuck". Here it will be important to develop back up strategies eg: spell check, thesaurus, dictionary, asking etc.

It is possible to add words to the voice model and it is easy to add badly spelled words to all of the systems. Predictive correction can slightly reduce this danger. Thankfully it is straightforward to find and delete "bad" words added in this way.

With the exception of Voice Xpress and FreeSpeech all of the remaining voice systems offer some degree of predictive correction. The NaturallySpeaking products offer new suggestions based on the letters you spell in *and* makes use of the word sound it hears. This give slightly better help than the system which predicts just on the basis of letters typed in.

Homonyms

Words which sound the same but are spelt differently depending on context can be a problem for many people. Voice recognition does not completely solve this difficulty. If you say "of" you could get "off" or "of". The user still needs to proof read and correct.

Correct as you go systems are likely to get more of these things wrong. They can only look at the last word when making a decision on the next. So if I say "to" then "big", I am likely to get "to big" (on the basis that "to" occurs more frequently than "too" or "two"). Continuous speech systems look at groups of words before making decisions. Hence "too big" is more likely to be correct. Equally if I say "British Steel" and make steps to correct it the systems should adapt to be able to get "British Steel", "I steal" and "high grade steel" correct - including the capitalisation.

Even though the continuous speech systems are better at this in the main, it is still necessary to put effort in initially to get them used to your particular word usage. Equally it is necessary to be aware of techniques to speed up these

processes. Personal support requirements will be significant in the early stages of voice recognition.

Enrolment

All of the systems require the user to do some reading to kick start the recognition process. Single words are read out one by one for discrete systems and the continuous speech systems need the user to read phrases and sentences. The language used in the enrolment process could well be difficult for many people and we would anticipate that many people who find reading difficult would need someone working with them to "whisper" the phrases to them as they work through the enrolments.

As a result of feedback from users IBM have included some "child friendly" texts. On newer versions of continuous speech systems the enrolment process requires much less reading. On a Pentium III computer NaturallySpeaking can be enrolled with just 5 minutes of reading.

Summary

Voice recognition does present some challenges for dyslexic users, but with appropriate training and support it can be an effective way of working. The built in vocabularies give the opportunity to *have a go* at using longer words which could otherwise be missed out of written material.

For people with severe literacy problems, where independent working would not be possible, it is still possible to use continuous speech systems in an assisted manner. Here the individual could prepare text, and a helper could make the corrections. This would be appropriate where it would be a "motivating" way of working for the individual - and it was seen as a step towards independence.

Opinions

From my experience of using these systems I would favour the following products for use with Dyslexic people:

Correct as you go:	Dragon Dictate, Kurzweil VoicePlus
Continuous speech:	Dragon NaturallySpeaking (preferred edition)
	IBM ViaVoice Millennium

Summary of Important features

	Dragon dictate V3	**Kurzweil Voice**	**ViaVoice 98**	**Free-Speech**	**Voice Xpress**	**Naturally-Speaking**
predictive correction	Yes	Yes	Yes	No	No	yes
correction	Word by word	Word by word	After "blocks" of dictation	After "blocks" of dictation	After "blocks" of dictation	After "blocks" of dictation
text to speech	Yes	No	Yes	Yes	Yes	in Preferred and Professional
Recorded speech	No	No	Yes	No	no	Preferred and Professional
Enrolment	Single words: 14 words	Single words	10 minutes of reading sentences	15 minutes of reading sentences	15 minutes of reading sentences	5 minutes of reading (on Pentium III)

Add-on Text-To-Speech Systems

As mentioned above most of the systems come with text-to-speech to allow you to listen to blocks of text. Users who have difficulty reading and choosing the correct word will need text-to-speech systems which will read out text within these dialog boxes.

Some examples:

Keystone:

This program has been designed to integrate with DragonDictate and Dragon NaturallySpeaking. When used with DragonDictate it echoes each word as it is recognised. In NaturallySpeaking it speaks out each phrase as it is recognised. For both programs it will read out the word lists offered during correction.

Available from:
Worlds Worldwide Ltd
Ash House, Belle Villas, Ponteland, Newcastle Upon Tyne, NE20 9BE
Tel: 01661 860999 Fax: 01661 822777
www.keyspell.com

TextHelp Read and Write

This package has been written to support people with dyslexia. It can read word lists and menus and has a built in homophone checker. It can be used successfully with continuous speech systems, but would not be particularly useful with DragonDictate.

Available from:
IANSYST LTD
The White House, 72 Fen Road, Cambridge. CB4 1UN.
Tel: 01223 420101
Fax: 01223 426644
Web: http://www.dyslexic.com

JAWS

This is a fully functioning screen reading program designed for by people who are totally blind. It is a high cost solution, but can be configured to work with DragonDictate, NaturallySpeaking and ViaVoice.

Available from:
Sight and Sound Technology
Quantel House, Anglia Way, Moulton Park, Northampton, NN3 6JA
Tel: 01604 798070