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NaturalReader: A new generation text reader

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NaturalReader (http://www.naturalreaders.com/) is a new generation text reader, which means that it reads any machine readable text using synthesized speech without having to copy and paste the selected text into the NaturalReader application window. It installs a toolbar directly into all of the Microsoft Office™ programs and uses a mini-board to read text in other applications such as Adobe 7™. The Neospeech™ voices which are available with the product are the most natural sounding synthetic voices that this reviewer has heard. The software has numerous additional enhancements which make it a program with universal design appeal. Overall this product exceeded most of the expectations for an electronic text reader and provided exceptional value for the low purchase price.

Natural Reader Overview

NaturalReader Features

Natural Reader is not marketed as an assistive technology (AT) tool. It is marketed instead to mass market audiences. The home page promises that NaturalReader will allow users to save time and eye strain, and improve writing and second language learning:

- NaturalReader saves eye strain – relax, sit back and listen
- NaturalReader saves time - listen while driving, exercising or enjoying nature
- NaturalReader helps writers – improve by listening to your work
- NaturalReader teaches second language students – expand your experience and understanding by listening to any text at any speed

(NaturalReader, n.d.)

Other claims are high quality, human sounding voices, "shocking" ease of use, and multi-program compatibility. In addition, the program promises to produce high quality audio output in a variety of audio file formats. Each of these claims was verified in the testing of this tool.

High Quality, Human Sounding Voices

Users have the option to download a variety of voices for use with the NaturalReader software. The website allows users to hear demos of the voices that are available. The program ships with Microsoft™ "Mike," "Mary," & "Sam." AT&tT Natural Voices™ and Neospeech™ voices are available for an additional small charge. The voice upgrade is highly recommended as the difference between the quality of the free voices and purchased voices is substantial. The reviewer found that the Neospeech™ voices were the most natural and the most pleasant sounding voices so she chose both the "Paul" and "Kate" Voice. With extended use, she found that she vastly preferred "Paul" over "Kate" as this Neospeech™ voice was pitched in a non-irritating range. The quality of "Paul's" voice was astonishing compared to earlier generations of synthesized speech. This reviewer played it for several of her colleagues and they didn't initially recognize it as synthesized speech - they thought the speaker was human.

The quality of synthetic speech is extremely important for both comprehension and user satisfaction. Research indicates that speech quality is particularly important with complex subject matter, which is typical in Post-Secondary programs. Subject's comprehension of synthesized speech deteriorates as a function of text complexity much faster than human speech, providing evidence that improving the quality of synthesized speech will yield gains in comprehension (Lai, Wood, & Considine, 2000). In addition, users clearly show a marked preference for natural voices in all demographic groups, including children as young as 7 years old (Ratcliff, Coughlin, & Lehman, 2002). Factors that most influence the positive rating of naturalness in synthesized speech include pitch variability, pause and rate (Ratcliff et al., 2002). Earlier generation synthesized voices are characterized by very

monotonic and uniform speech. The Neospeech™ Voices varied pitch appropriately and paused for punctuation.

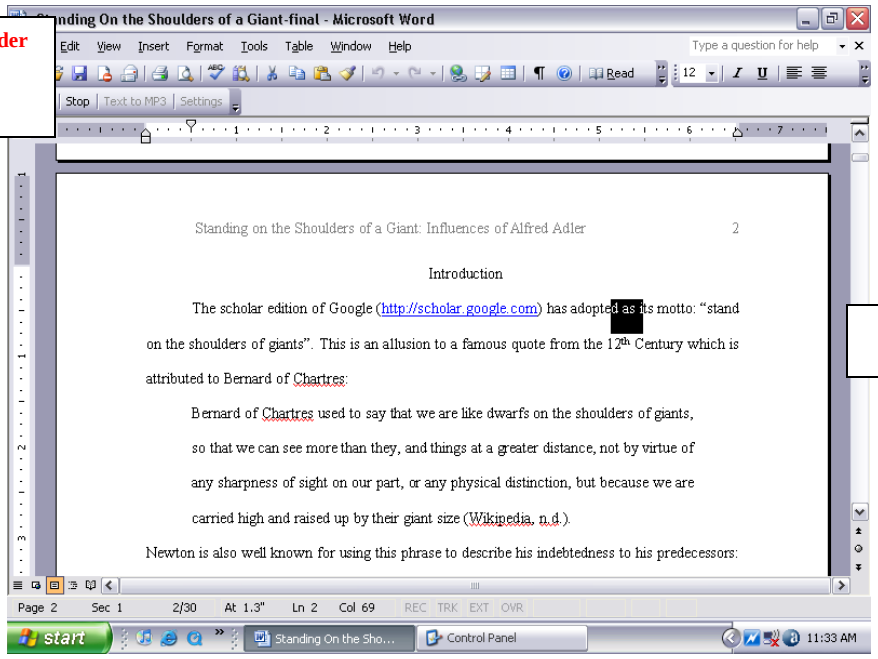
Poor synthesized voice quality may also lead to AT tool abandonment. Anecdotal observations of the adult students in the reviewer's adult basic education classes indicate that the quality of synthesized speech has a great impact on students' use of AT tools. Recently the reviewer's College decided to replace human speech on taped exams with speech produced by Kurzweil 3000™. Subsequently, students reported dissatisfaction with the quality of the Kurzweil 3000™ voice and abandoned the taped text during their exam. Their chief complaint was that the synthesized voice was monotonic and that it didn't pause appropriately, particularly in multiple choice exams. For example, the synthesized voice on the exam did not pause between the question stem and the multiple choice options, nor did it pause after reading the letter of the multiple choice option as a human reader would. NaturalReader would fix this problem because it pauses significantly after a period (.) and uses natural voice inflections that vary pitch.

Ease of Use

NaturalReader lives up to its claim that that it is "shockingly" easy to use. Use of the software is intuitive, adding to its Universal Design appeal. The program provides a short three minute demo which effectively demonstrates the main functions of the program. Further instruction is needed to use the MP3 function effectively.

NaturalReader is a text reading software which is incorporated directly into common computer applications. For example, users can use Microsoft Word and have the NaturalReader read the text while still in the Microsoft Office application window. This allows users to use all of the powerful features of Microsoft Word, such as the Dictionary Lookup feature, while enjoying the benefits of NaturalReader. To hear text in a Microsoft Office program, users either select text they want to hear and press the "text to speech" function in the toolbar or, if no text is selected, NaturalReader will begin reading at the curser location. Users can pause or stop the text reading at any time with the push of a button. While in

Microsoft Office programs, NaturalReader marks text as it reads so that users can follow along. In Internet Explorer, the text being read scrolls across the toolbar window. Users can easily control the rate of the text reader by clicking on the settings button on the toolbar. They can also change the voice used with this function. The following figure shows NaturalReader performing in Microsoft Word:



Powerful audio output

One of the most interesting features of NaturalReader is the program's ability to export audio output as MP3, WAV, or OGG audio files. In other words, users can create electronic copies of audio output to listen to on portable listening devices such as MP3 players. The reviewer converted a nine page PDF document into a MP3 file. It took approximately three minutes to do the conversion and the audio output file was 21MB in size. The audio file had the same quality as NaturalReader in the Text-to-speech mode. Due to the scholarly content in the article that the reviewer chose to convert to an audio file, listening

to the file without reading along with the text would have been challenging.

Advantages & Disadvantages of NaturalReader

The number one advantage of NaturalReader is its low cost. The company offers a free text reader but this is largely a tease for the "Professional Version" since the free version does not use natural voices and only reads 1000 characters at a time. The Professional Version is available with one natural voice for less than $50.00 US. Additional voices can be purchased at any time but, if potential users think they will want to purchase additional voices, these should be bought during the initial purchase for significant discounts. Voices that are not bundled with the software are almost $50.00 themselves. Other free text readers are available online including the E-Text Reader© from Premier Assistive Technology (http://readingmadeeasy.ca/Home.php) and HelpRead (http://www.helpread.net/) but these free technologies do not use natural voices and texts must be cut and pasted into the application window before they can be read. NaturalReader is comparable to Kurzweil 3000™ in quality but Kurzweil 3000™ sells for approximately $1500.00. NaturalReader is actually superior to Kurzweil 3000™ in synthetic voice output quality.

The second major advantage of NaturalReader software is its compatibility with common software applications. Users can use all of the powerful features of their resident software while listening to text-to-speech output. This creates tremendous writing advantages for users who can use the dictionary lookup, spell check and thesaurus features of Microsoft Word, for instance, and still use the NaturalReader toolbar without exiting Word. This compatibility also streamlines training for NaturalReader in cases where users are already using the Microsoft Office applications. This eliminates users having to be trained in software application that they are not likely to use as an adult, as in the case of Kurzweil 3000™ which is a more specialized learning tool. NaturalReader's compatibility with PDF documents is extremely useful in academic settings due to the proliferation of scholarly Journal Databases which typically provide fulltext in PDF formats. Many

photocopiers now will also scan documents to PDF format, allowing users to scan non-electronic text into electronic text that can be read by NaturalReader.

A third advantage of NaturalReader software is its Universal Design features. Universal Design features allow technology to be used by diverse audiences, promoting equitable access in the process. NaturalReader, for instance, can improve reading comprehension and writing outcomes for people with disabilities, members of minority cultures, individuals with different learning styles, and those for whom traditional approaches are not convenient (see Bowe, 2000). For example, the same audio output features of the software could allow a busy commuter to listen to office correspondences while driving home in the evening or allow a legally blind student to "read" an internet page. Similarly, the software could be used by both an ESL and learning disabled student to help decode written text. The software is particularly strong in the first three principles of Universal Design: Equitable use, Flexibility in use, Simple and Intuitive use. The fact that the software is marketed to such a wide audience not only keeps the cost of the product down, it also makes the software more acceptable to those with special needs as they are not segregated or placed apart from others through the use of the software (Bowe, 2000).

The main disadvantage of NaturalReader is that it does not have some of the learning tools that other text readers have. Both Kurzweil 3000™ and E-Text Reader© allow users to manipulate and modify text. For example, Kurzweil 3000™ allows readers to highlight the main idea and supporting details of a particular text. E-Text Reader© allows readers to highlight text and insert comments and bookmarks. Most users could be taught how to use these same features while viewing text within Microsoft Word but these features would not be available in other applications. NaturalReader also doesn't have the resident scanning ability that is a useful feature in Kurzweil 3000™. Kurzweil 3000™ scans both web pages and books into its application window exactly as they appear on the screen or book. Again, this deficit can be worked around by scanning non-electronic texts into PDF form using a scanner or photocopier. Picture and color rich documents will not scan as well as

they would in Kurzweil 3000™ documents. Kurzweil 3000™ and Text Help Read & Write 7.1 Gold™ also provide additional composition tools, such as word prediction, that would be useful to struggling writers, that NaturalReader does not have.

Target Audience

Potential Uses of NaturalReader

NaturalReader could be used by a very diverse audience. NaturalReader could be used as a speech synthesizer for persons with cerebral palsy or other communication disorders. It could be used as a text-to-speech device for visually impaired individuals. The auditory output combined with visual cueing would be useful to help children and adults with attention deficit disorder attend better to text. The auditory output could also assist users with reading disabilities to decode text. The reviewer found the software especially useful for editing writing. NaturalReader would improve classroom interactions by allowing disabled individuals equitable access to written text. It would also allow children with speech difficulties, who are equipped with portable computers, to communicate with their peers with real time, face-to-face computer mediated communication.

Research on Text-To- Speech Software for Learning Disabilities

NaturalReader software has multiple benefits for users with learning disabilities. Due to the fact that learning disabilities are often under-diagnosed (Lerner, 2000) and less visibly apparent than physical disabilities, universally accessible assistive technology may be especially important for this group of learners. Hasselbring and Bausch (2006) discuss the trial use of electronic text readers in a Kentucky school district. They noted that the use of electronic text readers significantly increased learning disabled students' access to grade level texts and assisted these same students with composition: "When students with learning disabilities can hear what they have written, their composing and editing labors are lessened" (p. 74). Hasselbring and Bausch focus quite extensively on the social, cognitive and affective benefits of

increasing students' access to grade level texts: "The assistive technology used in this project has freed thousands of Kentucky students with learning disabilities from the stigma and failure that they may have faced their entire school careers" (p. 74).

Engaging older students with reading disabilities with text poses additional difficulties. Elder-Hinshaw, Manset-Williamson, Nelson, and Dunn (2006) specifically discuss the challenges faced by adult students with reading disabilities in their classroom: "Older students with RD have difficulty accessing texts that serve as a basis for instruction; years of repeated failure can leave them discouraged and unmotivated" (p. 6). The bimodal (visual and auditory) approach to instruction that text readers create for learners "has been shown to impact comprehension by providing information with accuracy and at an accelerated rate, which might not normally occur if read without the support of the technology" (Elder-Hinshaw et al., 2006, p. 7). Elder-Hinshaw et al. (2006) combined text-to-speech software and Microsoft PowerPoint to allow their older students to complete Multimedia PowerPoint Inquiry Projects. The text-to-speech software facilitated their students' research on the internet and PowerPoint provided a medium to publish their research findings. It was motivating for their adult students to be using the same kinds of computer software used by their non-disabled adult peers. NaturalReader's compatibility with PowerPoint would have facilitated this process for the adult students. My own experience with adult students with learning disabilities coincides with that of Elder-Hinshaw et al. (2006). My older students do not want to spend their valuable time in remedial reading instruction - instead they want tools that will help them decode the texts that they must use to learn course content. This emphasis in adults toward compensation rather than remediation make NaturalReader's lack of reading tools less of a disadvantage for adult students.

Voice output software like NaturalReader may have many other benefits for learners with learning disabilities. Voice output software, for example, also works to build greater independence in writing for students with disabilities (Montgomery & Marks, 2006). Montgomery and Marks (2006) summarize research in which it has been demonstrated

that students with learning disabilities correct more errors in their writing when it is read to them than when they read it themselves. They also note that voice feedback has been shown to "improve the length of text, grammatical cohesion, and lexical density" (p. 35). Voice output can also improve reading comprehension and memory. Silver-Pacuilla and Fleischmam (2006) summarize research which shows that experiencing text bimodally (visual and auditory) enables poor readers to perform as well as their non-disabled peers in tests of reading comprehension. Bimodal presentations of text allow reading disabled students to focus on comprehension instead of text decoding. Multiple modes of input have also been shown to increase attention and the transfer of information into long term storage (Silver-Pacuilla & Fleischmam, 2006).

Further research shows that Assistive Technology, such as text-to-speech software, may be one of the critical elements in creating a successful transition to college for students with learning disabilities (Urquart-Engstrom, 2005). College requires students to be self-directed and independent learners, yet reading difficulties in childhood may create a multitude of barriers for college students to become independent learners. For example, reading disabled students read much less than their non-disabled peers, leading to a possible deficit in background knowledge. A deficit in background knowledge makes acquiring new knowledge very difficult since new learning is scaffolded onto previous learning (Urquart-Engstrom, 2005). A lack of prior reading experience may also lead to extreme difficulties in learning academic writing skills: "Lack of experience with text deprives students of the models they need to organize and structure their writing" (Urquhart-Engstrom, 2005. p. 31). Assistive technology allows college students to compensate for and sometimes remediate these deficits. NaturalReader's compatibility with Adobe 7™ would allow College students greater access and exposure to academic writing through journal databases. NaturalReader would also be particularly useful for College students taking distance education courses, as course instruction in distance education courses is typically text based rather than face-to-face (Klemes, Epstein, Zuker, Grinberg, & Ilovitch, 2006). Improved access to electronic text improves learning disabled students' performance in distance education courses (Klemes et al., 2006).

Research on Text-To- Speech Software for Physical Disabilities

Voice output software is critical for users with visual disabilities. Adaptive technology assists many visually impaired adults to enjoy successful careers, particularly in information technology (IT) and computer related fields (e.g. Millman, 2001). Visually impaired users are also able to be integrated more successfully into office environments due to the increasingly universal access to adaptive software. For example, Bob Woods, a legally blind IT worker in a multinational corporation, used to have to take clients or coworkers to his office if they needed to show him something on his monitor but now the utilities that he uses, such as Microsoft Magnifier, are available on any workstation (Millman, 2001). Besides Magnifier, there are a multitude of other software and hardware adaptations available to blind and visually impaired individuals (Massof, 2003). While NaturalReader would be more difficult to use for someone completely blind, this subgroup makes up only 10% of the legally blind population in the United States (Massof, 2003). NaturalReader could be used by a completely blind user through a modified keyboard as all of the program's functions are accessible though hotkeys. NaturalReader would be most useful to legally blind users who have enough vision to use the NaturalReader toolbar. NaturalReader's improved reading of Internet pages as compared to previous generation text readers will make it more attractive to visually impaired users.

Many of the software adaptations for visual impairments, such as NaturalReader, are being marketed to the baby boomer generation (Wildstrom, 2005). Wildstrom remarks on this current trend predicting that a wide variety of assistive technologies will be marketed to the vast baby boomer market: "clearly technologies that were originally designed for a relatively small number of people with special needs will be moving into the mainstream. If recent marketing trends are any indicator, more and more of the innovation will be aimed at users on the far side of 50" (2005, p. 02). NaturalReader has the ability to compensate for the most ubiquitous symptom of being 50 plus - vision loss.

NaturalReader also has the potential to be used for speech synthesis for users with communication difficulties. The naturalness of the speech would make it preferable to many current speech synthesis tools. Toto (2006) describes the use of computerized voices by ALS patients, which allow the patients to continue communicating with their loved ones after the disease has made it impossible to use their voices to do so. This is just one of many potential applications of speech synthesis software. As voice quality increases and portable computing devices become more affordable and accessible, speech synthesis will become a realistic option for more users with communication difficulties.

Conclusion

NaturalReader is an affordable and accessible assistive technology tool with a wide variety of applications. It has the potential to improve learning and the quality of life for disabled and non-disabled users alike. Its ease of use, compatibility with Microsoft Office programs, and high quality, natural sounding speech make it a tool of choice for learning disabled and visually impaired learners. It is most recommended as an adaptive or compensatory tool for adult learners as its potential for use as a remedial or learning tool is limited. Software programs like NaturalReader have the long term potential to increase access to print based material to audiences of all ages and backgrounds with never before achieved voice quality.

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