

General Description of this Project

Neurofibromatosis 2 (NF2) is a rare, inherited neurologic condition, the hallmark of which is bilateral vestibular schwannomas (VS). VSs eventually cause hearing loss that progresses to complete deafness without intervention, typically beginning in young adulthood. One of the biggest problems facing people with NF2 when they begin to lose their hearing is that they also begin to lose their ability to communicate using an auditory-verbal approach, which is what they are most accustomed to in all aspects of their lives. Most people with NF2 and hearing loss begin to struggle to understand spoken language but may be hesitant to learn sign language, as it can feel like more of a separation from family, friends, and co-workers who probably don't know sign language. Therefore, accommodations that make spoken language accessible are important considerations in this community.

While amplification can help many people with NF2 (i.e. hearing aids, cochlear or auditory brainstem implants), these devices don't provide adequate spoken communication support for most people in this community. Computerized technology that may support spoken communication for people with hearing loss is available. Many software programs have been made into apps appropriate for handheld wireless devices, such as smartphones and tablets, which allow for portability. Apps that translate speech to text (to be read) and text to speech (to be heard) exist but have not been evaluated for ease of use or effectiveness in supporting communication within the NF2 community.

We have identified existing apps that are most likely to help support spoken communication for people with NF2 and hearing loss or vocalization problems. Each app on this list was evaluated on an iPad by two reviewers, one who is an NF2 clinician and one who is a medical audiologist and deaf studies expert. We conducted accuracy testing with a standard paragraph for all speech-to-text apps and results are included at the end of this document. While we found no existing apps that could address all of the challenges related to communication for the NF2 community, there are several that have features that could be helpful.

Our vision for this project is that it is a stepping stone to open the dialogue within the NF2 community about the unmet communication needs of people living with this condition. This project is in no way exhaustive at this point and we intend to build this work further in many directions. We welcome feedback about the evaluations written here, apps that we might include in future evaluations, and ideas for other aspects of communication that we might explore. We hope that this information is helpful and look forward to working together with all who are interested in this important issue. Please reach us at abergne1@jhmi.edu.

Our best,

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TEXT-TO-SPEECH APPS THAT USE PICTURES

LOCABULARY PRO

Cost: \$129.99

Platform: Apple

Operating System: iOS 4.0 or later

Devices: iPhone (3GS and later), iPod touch (3rd generation and later), iPad

Memory Required: 585 MB

Language(s): English

Needs wi-fi to operate? No (but needs wi-fi to use the “nearby” feature)

Website: <http://locabulary.com>

Manufacturer’s Overview: Locabulary Pro communicates words, phrases, and sentences and can be used as a communication device for individuals who have difficulty speaking. Words are made available based on your GPS location. Vocabulary is offered in list view, with the emphasis on text although thumbnails can be linked to words and phrases if required. A keyboard is also available to type into for text-to-speech. Users can tag their own locations and create vocabulary for each location. Changes and additions can be backed up to the Locabulary server. Abbreviation expansion can be used to save and access phrases.

Positive Aspects of the App: We found this app easy to use with very little need for training/learning. We liked this app for quick communication with short phrases or one-word answers and it provides pre-programmed phrases for the categories of mood, need for assistance/help, and common one-word phrases such as “yes” and “no”. You can also quickly create and store phrases that are personalized in “my categories”, which may be helpful for situations in which some of the communication topics are known in advance. It is easy to access the keyboard within this app and type what you want to say, which can assist with more spontaneous speech. We appreciated that the font size can be easily modified to assist people with visual difficulties. There are a variety of options for voices that can be selected in terms of gender, accent and pitch/intonation, so users have a choice of “who” they would like to speak for them. With access to wi-fi, you can use the “nearby” feature to access vocabulary that might be appropriate for your location. For instance, if you are near a Starbucks, there is a category that will pop up that has words about coffee, tea, and types of beverages that they serve (i.e. latte, mocha).

Issue: This app is pretty basic in terms of pre-programmed language and the ability to organize a lot of personalized phrases for easy use.

Workaround: This app would be great for people who have a temporary need for verbal communication support, such as in the period following surgery when vocalization is not fully recovered, because it is easy to learn and use. However, if you have a longer term need for support with verbal communication, it would likely be best to invest in a different text-to-speech app that can provide a wider range of options and is more nimble.

Other Tips: If you turn the device to the side, the keyboard rotates, as well, which makes it larger and easier to use.

PROLOQUO2GO

Cost: \$219.99

Platform: Apple

Operating System: iOS 5.1 or later

Devices: iPhone (optimized for iPhone 5), iPod touch, and iPad

Memory Required: 311 MB

Language(s): American and British English

Needs wi-fi to operate? No

Website: <http://www.assistiveware.com/product/proloquo2go>

Manufacturer's Overview: Proloquo2Go provides a “voice” to individuals who are unable to speak or have difficulty speaking. Proloquo2Go enables people to talk using symbols or typed text in a natural-sounding voice that suits their age and character. The app is mainly picture-based, and the user can select an icon matching the desired word. A keyboard is also available to type in words or phrases. Custom phrases and categories, such as “About Me” can be saved into the app. Additionally, the display size, number of icons on the screen, and other settings may be adjusted according to user preference. This app can be used without a WiFi or 3G connection.

Positive Aspects of the App: We liked the ease of adding specific categories, phrases and words to the pre-programmed vocabulary. The app has a huge bank of pictures to use as representations for words and phrases that you create. We appreciated that the app stores recently used phrases so that you can go back and access what you said in the past 15 minutes, past hour, past day and earlier. The voices that come with the app (Tracy and Ryan) are of fairly good quality and there are many voices that can be downloaded to your device if there is a different character that you would prefer to speak for you. This app struggled less with NF2 terminology, including schwannoma, meningioma and ependymoma, than other text to speech apps. Another difference that we appreciated with this app was that it acknowledges punctuation in sentences, such as pausing after a period, which makes the computerized speech more similar to natural speech patterns. We liked being able to email or text message directly from the app. The app also allows for changes in the keyboard appearance, such as the size of the buttons and space between buttons, which can be helpful for people with visual concerns or dexterity issues (access under “options” and then “appearance”).

Issue: The keyboard that comes with the app is arranged in alphabetical order, rather than in QWERTY order (which is the layout for a computer keyboard), making it slow to use for people who are used to typing on a regular keyboard.

Workaround: If you would prefer a QWERTY keyboard, you can access the iPad/iPhone keyboard and use it to free type and then have the app speak for you. As a bonus, when using the QWERTY keyboard, the app has predictable text.

Issue: When using the iPad keyboard to type sentences, the app will speak everything that is written on the page each time.

Workaround: Erase sentences when you are through with them so that the app only speaks the phrase/sentences that you want it to.

Issue: The pronunciation of some words is not very accurate.

Workaround: Use the keyboard to type mispronounced words phonetically so that they are spoken more closely to how they sound.

Other Tips: Tutorials are available on the app's website for a variety of functions, to make it speak you can simply press the sentence line. The default setting on the app is button by button speech, meaning that as soon as you touch a button it speaks the word. We found that turning this feature off so that we could create a complete sentence first and then have it spoken worked better. To have the app speak the phrase you have created with pictures, touch the space where the pictures are lined up.

TOUCHCHAT HD AAC WITH WORDPOWER

Cost: \$299.99

Platform: Apple

Operating System: iOS 5.0 or later

Devices: iPhone (optimized for iPhone 5), iPod touch, and iPad

Memory Required: 607 MB

Language(s): English, Hebrew

Needs wi-fi to operate? No (need wi-fi to download extra features)

Website: <http://touchchatapp.com/apps>

Manufacturer's Overview: TouchChat generates words, phrases and messages with a built-in voice synthesizer or by playing recorded message. Five US English and 2 British English synthesized voices are available, allowing the user to choose a voice that fits their own personality. TouchChat also has a unique feature whereby one can simply tilt the device to make the message expand to fill the screen in large letters. This feature allows a person to communicate silently or in a noisy environment. Buttons are used to change pages, speak messages, adjust the volume, or clear the display. Information from other applications can be moved into TouchChat, and likewise the text generated in TouchChat can be copied to other applications. This version of TouchChat HD is bundled with the WordPower series of AAC vocabularies designed by Nancy Inman. WordPower24 includes seven vocabulary series which are intended to make communication easier and more intuitive.

Positive Aspects of the App: We found this app to be a good communication option for people who need speech support and have limited dexterity because you can program whole phrases to be spoken with the touch of one fairly large button. This app allows you to create pages (called

boards) based on common themes such as friends, family, and co-workers so that phrases/sentences are easy to find. There is word prediction on the keyboard, which is arranged in a QWERTY layout (the same as a computer keyboard, rather than alphabetical). We also liked the feature that allows for editing of how the app pronounces words. For example, we found that the app mispronounced both latte and neurofibromatosis and we were able to edit the pronunciation until they were more accurate. Also, this app has pictures that might be most engaging for kids who need speech support, as compared to other apps in this category.

Issue: This app requires a lot of personalization to work well and it is both difficult and time consuming to navigate this process.

Workaround: We would recommend working with a Speech Language Pathologist that specializes in Alternative and Augmentative Communication (AAC) devices to set this app up on your device and learn how to use it efficiently. Alternatively, you can access tutorial information on the website under “TouchChat Support” or via the “help” button on the app.

Issue: The voice quality is poor and sounds pretty synthetic/computerized.

Workaround: We found the voices of Laura and Ryan to be the most natural sounding.

Other Tips: We found this app challenging to use and would not recommend it for people looking for a quick or easy solution to support speech. It is not an app that can easily be downloaded and used in the short term. However, if you are looking for a long-term solution and are willing to invest both time and money in getting the app set up on your device and then practicing with it to become more familiar with all of its features, this app could be a good choice. Also, if you have your device muted the speech will not be heard. This is different from other text to speech apps which will speak even if the device is muted.

TEXT-TO-SPEECH APPS THAT DON'T USE PICTURES

PREDICTABLE

Cost: \$159.99

Platform: Apple

Operating System: iOS 3.0 or later

Devices: iPhone, iPod touch, and iPad

Memory Required: 635 MB

Language(s): English

Needs wi-fi to operate? No

Website: <http://www.tboxapps.com/predictable.aspx>

Manufacturer's Description: Predictable incorporates customizable Augmentative and Alternative Communication (AAC) functions with the latest social media integration. Folders are used to store quick phrases or prepared messages, and a history feature allows the user to access the most recently used phrases. The word prediction feature learns the user's vocabulary and generates appropriate next words to minimize keystrokes. The app can also be used to compose emails, update Facebook status, send Tweets, and send SMS messages. Additionally, a note pad option allows the user to hand-write on the screen instead of using a keyboard.

Positive Aspects of the App: We liked the word/phrase suggestion buttons available with this app, which might be particularly helpful to people with decreased dexterity. The program learns words and phrases that are more often used and will predict them more frequently as it gets to know the user's speech pattern--the more you use it the app the faster and more personalized it becomes. We also liked the ease of adding to, editing and storing stock phrases that you might use often so that they can be easily accessed and spoken. There are a variety of options for voices that can be selected in terms of gender, accent and pitch/intonation, so users have a wider choice of "who" they would like to speak for them than with other apps. This app acknowledges punctuation which allows more control for the user over the phrasing of the speech generated, which we found made a big difference when trying to communicate. The word/phrase completion tool can be used to quickly generate written language and then post it to an email/social media outlet; we liked this potential use for people who have decreased dexterity and more difficulty typing. You can also add pictures to your written text before sending it to email or posting it to a social media outlet. This app has a drawing tool/chalkboard so users can write freehand instead of typing if they choose.

Issue: There is no spellchecking tool or in-word completion tool on the Predictable keyboard.

Workaround: You can allow the iPad keyboard to override the Predictable keyboard. The iPad keyboard has a spellchecking tool and in-word completion.

Issue: The program does not allow you to pre-type multiple phrases on the notepad and then select them one at a time to be spoken, it reads everything that is typed one right after the other each time you press Speak.

Workaround: Create a folder in which you can store prepared phrases and open it as needed in conversation.

Issue: A good amount of medical terminology that might be used by someone with NF2 (i.e. schwannoma, meningioma) is jumbled and not spoken clearly.

Workaround: Slowing the rate of speech (in the app options) when using medical terminology helps the device to more accurately pronounce words, but we found some medical words are still not clear even after slowing the speech down.

Other Tips: If you don't need predictable text, the iPad keyboard is easier to use than the Predictable keyboard. Also, in order for the speech to be separated correctly into phrases, and therefore sound more like natural speech, you must punctuate (i.e. commas, question marks). Turning the device sideways give you a much larger keyboard.

VERBALLY

Cost: Free

Platform: Apple

Operating System: iOS 4.0 or later

Devices: iPad

Memory Required: 329 MB

Language(s): English

Needs wi-fi to operate? No

Website: <http://verballyapp.com/>

Manufacturer's Overview: Verbally is an easy-to-use, comprehensive Augmentative and Alternative Communication (AAC) app for the iPad. Verbally offers Core Words and Core Phrases grids with the most commonly used words and phrases, as well as a text prediction feature. There are three options for keyboard layouts and a choice of male or female voices. No WiFi or 3G connection is required to use the app.

Positive Aspects of the App: Verbally is good for people with limited dexterity, we liked the fact that you can slide your finger from key to key on the keyboard (though not on phrases) if you miss the key you meant to type. Also, you can choose where the keyboard is located on the screen and how the keys are laid out (QWERTY or alphabetical). We liked the fact that you can repeat last phrase used easily, as this is a common need. We found the stock phrases to be more varied and helpful than other apps, and we very much liked having buttons for "yes" and "no" so that these words are quick to locate and speak. The Verbally keypad is easier to use than other apps and the iPad keyboard cannot override it, which we appreciated while using the app. Also, Verbally speaks words in real time as you type and will speak phrases right away when you

select them rather than touching to select a phrase and then touching different button to make it speak.

Issue: The speech quality is not as good as other apps in this category.

Workaround: We found no solution to this issue within the Verbally app.

Issue: Typed phrases disappear after they are spoken so you are not able to go back and edit or add to it and speak it again without retyping the whole thing.

Workaround: Create stock phrases that you might use more frequently and save them in folders. This doesn't totally solve the issue but can help because stock phrases can be repeated and are editable.

Issue: There is no spellchecking tool so misspelled words can be mispronounced unless they are phonetically similar to the correct spelling, for example, "celery" and "cellery" are pronounced the same so this misspelling doesn't impact communication.

Workaround: Proofread text before pressing speak and add words into saved folder that you might tend to misspell. Also, if you are uncertain about the spelling of a word, hold your finger on the word until the magnifying glass pops up and it will give you several other options for spelling the word correctly. You can also use the predictable feature to choose from words that are close to what you are trying to spell.

Other Tips: If you are a good typer, leave the "steady hands" off. Use this feature only if you are not as good at typing or have dexterity issues.

VERBALLY PREMIUM

Cost: \$99.99

Platform: Apple

Operating System: iOS 4.0 or later

Devices: iPad

Memory Required: 329 MB

Language(s): English

Needs wi-fi to operate? No

Website: <http://verballyapp.com/>

Manufacturer's Overview: Verbally Premium is a full-featured augmentative & alternative communication (AAC) app for the iPad that brings speech to those without. Verbally Premium has the same intuitive design as Verbally, but also includes a host of expanded features to make real conversation a reality. Users can choose from five voices which can then be customized in speed and pitch. Custom phrases can be added and saved, and conversation history is saved. The word prediction feature is more efficient in this version, and users can also use it to generate email.

Positive Aspects of the App: We found a significantly higher voice quality with this version of Verbally than the free version. The user can change the pitch, rate and volume of the voices. There are also short personality descriptions for the voices to help users select the best representation for themselves. We found the intonation of the voices in this upgrade better than the free version, and we also found them better than other text to speech apps. This upgrade also allows you to edit and save frequently used phrases. There is prediction language so as you type the app offers words that you can select to be able to complete the typing faster. We liked the appearance of the keyboard on this app much better than the keyboard that comes with Predictable, and found that being able to create sentences having common words, free typing on a keyboard and predictable language on the same page made communication much faster than with other apps that require you to go back and forth between different screens to access all of these options. There is also a button that allows you to tell the app to speak each word rather than waiting until you're done typing to press speak, if you prefer that option.

Issue: Typed phrases disappear after they are spoken so you are not able to go back and edit or add to it and speak it again without retyping the whole thing.

Workaround: Create stock phrases that you might use more frequently and save them in folders. This doesn't totally solve the issue but can help because stock phrases can be repeated and are editable.

Other Tips: We found this version of Verbally much better than the free version and well worth the upgrade if having speech support on a regular basis is a need. It is user friendly and quick to learn, but has the ability to support spoken detailed spoken communication.

SPEECH-TO-TEXT APPS

All of the speech-to-text apps had similar issues so we chose to address them all up front rather than one at a time within the evaluation for each app. The main concern has to do with accuracy of text/dictation of each app. We found most of these apps to have moderate accuracy which degraded with background noise. We also found medical terminology challenging for some of these apps. We have included at the end of this section an accuracy comparison of these apps. We read the same paragraph to each app in a quiet medical exam room and in a busy cafe. You can see the number of errors that each app made in each setting.

As a note, these dictation apps are designed to be used over and over by one speaker (the owner of the app) and to be “smart” so that they improve with time as they learn the speaker’s voice profile. However, this feature may not apply if the app is being used to support communication (rather than personal dictation), as there may be a wide variety of speakers using the app rather than just one person.

To maximize the accuracy of these apps and best support communication, we suggest that you:

- 1) ask the speaker to speak somewhat slower than usual
- 2) ask the speaker to enunciate a bit more than usual
- 3) ask the speaker to state punctuation marks (i.e. period, comma, open parentheses, new line)
- 4) keep the length of the dictated speech to a few sentences at a time to allow for frequent error checks/corrections
- 5) have the microphone of the device close to the speaker’s mouth, or use an external microphone that can be plugged in or activated by Bluetooth technology (we didn’t evaluate this but think it makes sense)

DRAGON DICTATION

Cost: Free

Platform: Apple

Operating System: iOS 4.0 or later

Devices: iPhone, iPod touch, and iPad

Memory Required: 9.6 MB

Languages: English, Japanese, Mandarin, Cantonese, Czech, Korean, Bahasa, Hebrew, Hungarian, Danish, Dutch, Finnish, French, German, Greek, Italian, Norwegian, Polish, Portuguese, Turkish, Romanian, Russian, Spanish, Slovak, Swedish, Arabic, Ukrainian, Vietnamese, Thai, Croatian

Needs wi-fi to operate? Yes

Website: <http://www.nuance.com/for-business/by-product/dragon-dictation-iphone/index.htm>

Manufacturer’s Overview: Dragon Dictation is a voice recognition application that allows the user to speak and instantly see the text. The app can be used for generating texts or emails, or

submitting texts to social media applications. It has an editing feature that provides a list of suggested words. The app requires WiFi or 3G network connectivity.

Our Overview: We found this app easy to use, including ease of dictation (“tap and dictate”), emailing text, cut/copy text, and posting text to social media outlets. The text appears fairly quickly, though is not “instant” so there can be some pauses in conversation as the text catches up. Text is editable after it appears, though this requires transferring the device back and forth from the speaker to the reader. This app allows for end of speech detection and reminds you where microphone is located at all times. The user can write questions ahead and then select space below the written question for the dictated answer to appear. We appreciated being able to email the entirety of the text, which is potentially a good option for users who access this app to support communication in a medical setting and want to have a written copy of the conversation to review after the appointment. This app requires little motor dexterity, as long as the speaker/other person does text correction.

Other Tips: Pressing return between segments of conversation (or having the speaker say “new line” several times) can help to distinguish what is being discussed/said and when the subject has changed. Be sure you don’t need the text in front of you anymore prior to emailing it, the text will disappear after being emailed. Perhaps email to yourself first and then forward to others so you have a copy.

VOICE DICTATION

Cost: \$0.99

Platform: Apple

Operating System: iOS 4.0 or later

Devices: iPhone (3GS and later, optimized for iPhone 5), iPod touch (3rd generation and later), iPad

Memory Required: 13.9 MB

Languages: English, French, Spanish, Italian, Belgian, Swiss, Arabic, Greek, Turkish, Czech and Hungarian

Needs wi-fi to operate? Yes

Website: <http://appplot.com/apps/detail/492594590/voice-dictation-voice-to-sms>

Manufacturer’s Overview: This app allows the user to dictate a message as a convenient way to send text messages or emails, update Facebook status, or send messages on Twitter. The app uses speech recognition software that improves with time. It also features automatic grammar correction.

Our Overview: We found this app easy to use, including ease of dictation, emailing, copying text and posting to social media outlets. Text is editable after it appears. We appreciated being able to email the entirety of the text, which is potentially a good option for users who access this app to support communication in a medical setting and want to have a written copy of the

conversation to review after the appointment. This app requires little motor dexterity, as long as the speaker/other person does text correction. You can open this app within other apps if you would prefer to have dictations flow directly into a certain type of document or file. We found it helpful to pre-create text/questions in the app that can be answered by the other person to create a stream of conversation. It was easy to change the size of the font in this app, which could be particularly helpful to people with visual concerns.

VLingo

Cost: Free

Platform: Apple

Operating System: iOS 4.0 or later

Devices: iPhone, iPod touch, and iPad

Memory Required: 5.2 MB

Languages: English

Needs wi-fi to operate? Yes

Website: www.vlingo.com

Manufacturer's Overview: Vlingo for iPhone combines fast and accurate speech recognition technology with the intelligence to listen to what you say, and quickly connect you with people, businesses and activities so that you can get things done while on the go. Vlingo features direct-SMS functionality (no pasting), as well as easy integration with mapping, email and search functions. It even connects you to your third parties – like Facebook and Twitter. Turn your words into action today by downloading Vlingo on the Apple App Store.

Our Overview: VLingo was created as a virtual personal assistant to be used to dictate emails or updates to social media pages. There is no mechanism by which to dictate into a document within this app. You can select email and use the dictation feature—this allows for text editing and then you can send it to yourself. However, this is a more complicated way to do what Dragon and Voice Dictation do automatically. Also, since this app was created for shorter dictations, it stops recording and converting speech after about 12 seconds. We found this frustrating when we were doing the accuracy testing (see the end of this section) and we needed to break that paragraph into three separate messages. There are better options than this for speech to text conversion right now, such as Dragon Dictation and Voice Dictation, and we would suggest using one of those to support communication rather than this app.

PAPERPORT NOTES

Cost: Free

Platform: Apple

Operating System: iOS 4.2 or later

Devices: iPad

Memory Required: 4.8 MB

Languages: English, Japanese

Needs wi-fi to operate? Yes

Website: www.paperportnotes.com

Manufacturer's Overview: PaperPort Notes is a digital note taking tool for the iPad that is transforming the way people create and share information. Now you can combine documents, web content, audio, typed text as well as hand written notes into a single document that you can easily organize and share with anyone.

Our Overview: This app is primarily an annotation app. It can be used to store, organize and mark up written documents, as well as share an entire document or specific pages by email. It can be used in conjunction with Dragon Dictation or Voice Dictation as a way to store the dictations created and go back to reference them, for instance a user could create a file of all dictations made during medical appointments and then store and organize them to reference at a later date and share with others as desired. However, this app does have a speech-to-text function which can be used to bring dictations directly into a page of notes that can then be marked up, filed and stored within the annotation portion of the app. You can access the dictation function by touching a blank note page to bring the iPad keyboard up and then using the button that says "tap and speak".

ACCURACY TESTING OF SPEECH-TO-TEXT APPS

Considerations

The person whose voice was used for this testing is a Caucasian woman who speaks American English as her primary language and has no detectable accents or speech difficulties/disorders. Variations in voice may impact the accuracy of speech-to-text apps. Also, as a point of interest, Nuance Communications (which owns Dragon Dictation) has recently purchased both PaperPort Notes and VLingo so it is possible that the voice recognition accuracy on these apps may change with any updates that Nuance makes to them.

Sample Text

This text was created as a trial of the voice recognition accuracy of this app. By using the same text and the same voice profile, we can get a pretty good idea of how accurately each program translates speech, allowing us to compare them. Any errors in dictation will be in bold, so you can easily see where the program made the mistakes. The number of errors will be counted (including punctuation errors) and combined to give an accuracy score for each program. And to see how it can manage in a medical setting, we'll include a few words well known to people with NF2, such as bilateral vestibular schwannomas and associated symptoms of tinnitus, hearing loss, and balance dysfunction. We'll see if this program can tell a schwannoma from an ependymoma from an astrocytoma, and also whether it has heard of DNA testing for the NF2 gene.

Dragon Dictation in a medical office: Results = 11 errors

This text was created as a trial of the voice recognition accuracy of this app. By using the same text and the same voice profile, we can get a pretty good idea of how accurately each program translates speech, allowing us to compare them. Any errors in dictation will be in bold, **see** you can easily see where the program made the mistakes. The number of errors will be counted (including punctuation errors) and **combines** to give an accuracy score for **you** each program. And to see how it can manage in a medical setting, **will** include a few words well known to people with **an F2**, such as bilateral **this tubular** schwannomas and associated symptoms of tinnitus, hearing loss, and balance dysfunction. We'll see if this program can tell a schwannoma from an **impending Mommo Feminin** astrocytoma, and also whether it has heard of DNA testing for the **I have to Jean**.

Dragon Dictation in a busy cafe: Results = 28 errors

This text was created as a **child** of the voice recognition accuracy of this app. By using the same text **in** the same voice profile, we can get a pretty good idea of how accurately each program translates speech, allowing us [**to compare them**]. Any errors in dictation will be in bold, **see** you can easily see where the **programming pistons**. The number of errors will be counted (including punctuation errors) and **combines** to give an accuracy score for each program[. **And**] to see how [**it can**] **management [in a medical]** setting, **will** include a few words well known to people with **anorexia[,]** such as bilateral vestibular schwannomas and associated symptoms of

tinnitus, hearing loss, and balance dysfunction. We'll see if this program can tell a schwannoma from **independent MOMA** from an astrocytoma, and also whether it **said [heard of]** DNA testing **[for the NF2 gene]**.

Voice Dictation in a medical office: *Results = 9 errors*

This text was created as a trial of the voice recognition accuracy of this app. By using the same text **in** the same voice profile, we can get a pretty good idea of how accurately each program translates speech, allowing us to compare them. Any errors in dictation will be in bold, so you can easily see where the program made the mistakes. The number of errors will be counted (including punctuation errors) and **combines** to give an accuracy score for each program. And to see how it can manage in a medical setting, **will** include a few words well known to people with **an F2**, such as bilateral vestibular schwannomas and associated symptoms of tinnitus, hearing loss, and balance dysfunction. We'll see if this program can **Teala** schwannoma from **independent MOMA** from **Aster cytoma**, and also whether it has heard of dna testing for the **nft** gene.

Voice Dictation in a busy cafe: *Results = 40 errors*

This text was created **[as a]** trial **[of the]** **invoice** recognition accuracy of this app. By using the same text **[and the]** **missing** voice profile, we can get a pretty good idea **[of]** how accurately each program translates speech, allowing us to compare them. Any errors in dictation will be **[in bold, so]** able to easily see **what [the program makes mistakes.]** the number of errors will be counted (including punctuation errors) and **combines** to give an accuracy score for each program **[. And]** to see how it can manage in a **minute [setting, we'll include]** **if you weren't** well known to **[people with NF2,]** such as bilateral vestibular schwannomas and associated symptoms of tinnitus, hearing loss[,], and balance dysfunction. We'll see if this program can **Teala** schwannoma from **independent MOMA** from an astrocytoma, and also whether it has heard of DNA testing for the **teaching [gene]**.

VLingo in a medical office: *Results = 50 errors*

This text was created as a trial of the voice recognition accuracy of this app. **Are** using the same text **in** the same voice profile, **did you** get a pretty good idea **how how [accurately]** **this** program translates speech, allowing us to compare them. Any **air is on vacation** will be in bold, **see** you can easily see where the program made **in the states**. The number of **Paris for** be counted **absent friend to see** including punctuation errors) and **combines [to]** **get** an accuracy **square free you** program. And to see how **I** can manage in **the** medical setting, **will** include **if you were** it's well known to people with **an have to**, such as **by lateral the Steelers for no MySpace to see if it ends at 10 test**, hearing loss, and balance **to function**. **Will** see if this program can tell **which one I'm a minute and panda mama from in to sites,**, and also whether it has heard of DNA testing for the **nf to Jean**.

VLingo in a busy cafe: *Results = too many to count (none are bolded because we didn't know where to start)*

This text it's free did I love the voice recognition accurate app. I'll to get a pretty good idea on my hair then. And here in Houston will be you the. And a very tiring hello Karen. Any carrots and he said he would have. The number of here is the be counted as a friend Teresa Karen close of mine to give a nap. To see how it manages the medical center, if you were it's known to people with such a bad lateral the Steelers won David, hearing lots a chance. Will see if this program cellist oh minute the after thanks, and also weather if you need to see.

PaperPort Notes in a medical office: *Results = 12 errors*

This text was created as a trial of the voice recognition accuracy of this app. By using the same text **in** the same voice profile, we can get a pretty good idea of how accurately each program translates speech, allowing us to compare them. Any errors in dictation will be in bold, **see** you can easily see where the program made the mistakes. The number of errors will be counted (including punctuation errors) and combined to give an accuracy score for each program. And to see how it can manage in a medical setting, **will** include a few words well known to people with **an F2**, such as bilateral vestibular schwannomas and associated symptoms of tinnitus, hearing loss, and balance dysfunction. We'll see if this program can **Teala** schwannoma from **[an] independent**, from **[an]** astrocytoma, and also whether it has heard of DNA testing for the **MF teaching**.

PaperPort Notes in a busy cafe: *Results = 18 errors*

This text was created as a trial of the voice recognition accuracy of this app. By using the same text **in** the same voice profile, we can get a pretty good idea **[of]** how accurately each program translates speech, allowing us to compare them. Any errors in dictation will be in bold, **see** you can easily see where the **programming [made the] six**. A number of errors will be counted (including punctuation errors) and **combines** to give an accuracy score for each program. And to see how it can manage **[in]** a **lot of** setting, **will** include a few words well known to people with **two**, such as bilateral vestibular schwannomas and associated symptoms of tinnitus, hearing loss, and balance dysfunction. We'll see if this program **[can]** **Teala** schwannoma from **[an] independent [,]** from an astrocytoma, and also whether it has heard of DNA testing for the **NFT** gene.