How to Overcome Troubled Speeches?

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Abstract---The use of speech based assistive technologies has been coined by a misused term named as "troubled speeches". "Troubled Speeches" are not aiding in communication as communication problems are being overcome by modern research and technologies. There came certain stages in boosting such technologies as a result of certain issues in interpretation and issues in problems of serving others with rich and superfluous languages. Speeches are generated to disabled as a result of inculcating latest technologies by lowering and increasing pitches of the specifications of the machines. "Troubled Speeches" are modified purposes of better performance of the speakers in speech technology. As the performance of these technologies was fluctuating, there is dire need of improvement in technology. In a galaxy of tales, some become available to overcome such issues and other is not available to achieve their goals. Certain progress in this field is being done and in the near future, there are expectations for such progress to be done. Many technologies such as AAC, dynamic devices and other such have been introduced for overcoming these problems must be done in this field, more communicative and more collaborative.

AAC, communicative issues, dynamic devices, fluctuations in technology, speech based assistive devices, superfluous language, Troubled speeches,

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1 Introduction

Hurdles in speech and dialogue system have generated many such devices that can be helpful in creating helpful speech on behalf of the impaired and to the listener or conversant. Such speech-based assistive devices have maintained a prestigious environment for all. There are a lot of reasons for which the people lose their ability of speech, as some have innate problems and others have lost it at some stage of their lives. Being problematic, these disabilities cause many difficulties while speech production. For such purposes speech based assisted technologies were assisted.

In 1960, in United Kingdom, such first speech-based assistive device sip-and-puff typewriter controller named as patient-oriented selector mechanism (POSSUM) was invented. This work was done by RegMaling. It worked resulting into an illuminated display. Its functioning was equipped by photoelectric cell. In 1966, PrentkeRomich Company was created by Barry Romich. The first device of Romich Company Prentke was produced in 1969 in the form of a typing system. Its working was based on a discarded Teletype Machine This work of speech-based assistive technology was sparked by Delft University researchers in Netherland in 1970 in the form of Lightspot Operated (LOT) typewriter. There are the contributions of many other companies as well, who have now been prominent in the field of speech generated devices. Such companies include Toby Churchill Limited by Toby Churchill in 1973 and US Dynavox-Sentinent's System Technology in 1982 which was a result of a project of the student at Carnegie Mellon University It was a brief sketch of speech-based assistive technologies mentioned chronologically. There are certain other advancements in this field which are worth mentioning. Such other organizations which are aiding in speech-based assistive technologies are Texas Speech-Language-Hearing Association, Alliance for Technology Access, American Speech Language Hearing Association, Centre for Disability and Development, Cleft Palate Foundation, Easter Sales (national Office), and Scottish Rite Foundation. These organizations are founded with establishing purposes regarding language production.

While creating a story, if a person is not able to speak properly and he/she daily faces such problems that leads him to certain disorders such as, confusion, lack of confidence,

shivering while talking to others, slow learner, neurological or psychological disorders, such devices can help him/her in maintaining a proper prestige in the field of speech production. In this way, he would be quite comfortable and convenient in his speech performance. He was good in his speaking and listening skills and yet more was to come. Until yet (2019), there is research on going in this respect for welfare of people who are having speech disabilities. Speech disabilities mean to be non-fluent in speech production i.e production of speech sounds goes to zero performance. For such problems, speech based assistive technologies have been produced. Speech based assistive devices are for disabled persons. In USA, 2 million people, 200,000 in Canada, in Australia 12 per 1000, and in United Kingdom, 6 per 1000 are disabled.

2 Automatic Speech Recognition and "Troubled Speech":

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Automatic speech recognition can be characterized as:

1. Speaker dependence
2. Speech continuity
3. Vocabulary

1. Speaker dependent automatic speech recognition contains a system which needs training for each speaker. Speaker independent automatic speech recognition is based on the training database for the recognition of new speakers in the presence of the previous speeches. Automatic speech recognition can be adaptive as the first step is speaker independent and through training, the system is adapted to a particular training.

2. The next characteristic of Automatic Speech recognition is speech continuity as an isolated word recognition system, connected word recognition system and continuous speech recognition systems.

3. Automatic Speech Recognition is trained to be based on small and large vocabulary size.

There can also be the errors in speech recognition systems. Errors can be due to the intensity of a speech sound of a person that a machine would be unable to receive the sound. For this error to be resolved, a person should be relevant and much vocal in speech. It there would be error free input, the output would be error free.

2.2 Speech Based Assistive Tools and its progress at speech production:

Pronunciation is the reflection of our speech without neural support, but if this pronunciation is related to some kind of image formation or image building, than it would be more convenient for people with disabilities. Text-to-speech software is an assistive tool for those who are having learning disabilities. In a recent article by Mark Wycisilk and Catherine Ellis, published on June 18, five soft wares with recent advancements have been highlighted for better understanding of speech impaired persons. The function of these paragraphs is to read aloud individual paragraphs or the whole text document. Balabolka is free text-to-speech software. This software is used for hearing impaired people and blind ones, for speech pronunciations. For input, the text txt is copied and pasted into the programs and another was is to assist the input with file formats, e.g HTML, PDF and DOC. For output, there are eight different voices for SAPI4 and two different voices for SAPI2. Microsoft Speech Platform is also for this purpose. Speech, volume and pitch can be adjusted on text-to-speech software. The other functions include audio files with a number of formats WAV and MP3. This software is helpful for bookmarks as well and is comprised of tools for word pronunciation as they like. Natural Reader is software used to download documents into its library and have them read aloud from there. This speech software is best for those who have good vision capabilities and can pronounce after visualizing the specific text. All the manageable and impressive types are in an ebook format. Optical Character Recognition is also used to load and scan a text or photo and have it to be readable to others. Panpreter Basic is another software uded for change in language and destinations. It is for reading text aloud. WordTalk is an impressive Toolbar made by University of Edinburgh. The ability

to read aloud the paragraphs is the specification of this software. Zabaware Text-t-speech Reader software is used to read aloud text.

Kurzwell 3000 is software that aids in improvement in literacy. This software includes features such as text magnification, talking spell checker, graphics for more than 40,000 words, support for 18 languages and dialects and more. Kurzwell is for Windows, Mac and iPad. Low Tech Handouts are used for adopting good neural skills. These samples of Handouts can be seen in Houghton Miflin Harcourt. Sandwich chart is used for paragraph writing, sequence chart for narrative writing, and sense chart for descriptive writing. Draft building is for the process of creating. The features include, a bibliography tool, and spell checker. Windows and Macintosh are for draftbulder. It helps in promoting motor skills for writing capabilities.

In an Assistive Listening System, there are a lot of the listening aids. These are used a hearing aids and cochlear implants according to National Association for the deaf. In a recent article, there are 5 listening aids that help the hearing impaired to listen. The names of the listening aids include ListenTalk, Listen everywhere, Listen Loop, Listen IR and Listen RF. It includes wireless technology and wi-fi in many of these. FM systems are for sendorineural hearing loss according American Speech Language Hearing Association. Sound field systems aid in hearing, auditory and learning problems. Association of Speech and Hearing Association is working for better hearing aids which can help in better pronunciation of a language. Sip-puff-systems are used for the students with paralysis and fine motor skill disabilities. Jouse3 is a sip and puff system. It is used for drawing an computer games. It has two types of mouthpieces which supports Macintosh, Unix, Linux, Windows in addition to iOS mobile devices and Android. Proofreading software having proofreading features, Ginger helping students with dyslexia in its features (Grammar checker, word prediction, written material past mistake made by the students, etc. Ghotit is software featuring to learn from past mistakes. Math Tools are used for students with blind tools. Math talk can help students having disabilities. Math simulations are used for students with ambiguity in Math's concepts.

3 Influence of Speech Impairment disorders on "Troubled Speech" and Speech-Based Assistive Technology

Speech impairments for which speech based assistive technologies were required can be summarized into three types, i.e. articulation, fluency, non-fluency and voice disorders. Articulator disorders are related to the people having lack of ability in the articulation of speech sounds. In some situations, it is happened, a child misses to pronounce some individual or coupled alphabets. These missed alphabets are categorized as Omissions For example, in the word "slow", the specific person is going to pronounce it as "low". Although it is complete form of a verb, but the meaning of a word depends on the meaning of a context. Hence, the respective person is wrongly pronouncing "slow" as "low". The perfect use of word can be simplified in the sentences:

1. He is slow in performance.
2. He is low in grades.

Another example is the pronunciation of "magnetic" as "gnetic". In this situation, there is omission of two words at the start. Some other examples include, pronouncing "while" as "ile", "Net" as "et", "courage" as "urage", "gamma" as "mma", "stainless" as "ainless" and "book" as "ook" etc. This word pronunciation crates difficulty while pronunciation. These types of speeches are called troubled speeches i.e difficult to understand for others. The examples such as "class" for "flass", "duck" for "cuck" and "hero" for "sero" is related to substitution disorders. Substitutions mean change in the word alphabets. Distortion is another disorder of speech impairment. It changes course from exact word pronunciation to distorted word. For example, "boat" to "coat" and "stout" to

"blout". It can be characterized as complex and less understandable speech. For such speeches, certain other speech based assistive methods and technologies have been introduced. Culturally, speech impairment creates problems in society. A deaf cannot hear properly and a dumb cannot speak properly, where as a blind cannot visualize properly. If there will not be much improvement in this regard, there will be less education and less employment. Certain Teaching strategies can also be helpful in diagnosing capabilities.

Fluency disorders involve disorders for being less fluent in speech. It can be characterized as "stuttering" and "cluttering" Stuttering is the rapid-fire repetitions and cluttering is the fast speech pronunciation. Non-fluency disorders involve stammering in speech. Voice disorders involve voice which is the result of the voice disorder in the larynx. There is absence in pitch, loudness, resonance and vocal quality. 20% children are receiving services for speech and language disorders in special education. 55.2 % with a disability raning from 2 to 5 years old are receiving speech and language services.

3.1 Augmentative and Alternative speech based technology:

AAC technology is a combination of three components: Language components, Hardware and software components etc. Language components are represented by alphabet, text, single meaning pictures and symbols and icons with having more than one meaning. Vocabulary words are of core importance having high frequency. Few of the words are extended having low frequency. Some of the words are specifically related to the topic. Novel and Pre-stored are two methods of utterance generation in it. The working of these language components depends upon its hardware and software components. Features being displayed are symbol type, display type and size, number of grid locations, number of pages, encoding and color. AAC consisted of control and selection methods. One is direct selection related to hardware and other scanning relating to software. Direct Selection involves Keyboard, head pointing., eye gaze, morse code, and brain computer interfaces. Scanning includes one or two switches and scanning pattern. The output is in the form of speech. It can be digitized and synthesized both. Digital voices are those that are individually created. Input can result into display output which is electronic. AAC includes unaided communication system, High Tech AAC and Low Tech AAC. Unaided communication systems are those which are not electronically aided. These aids include gesture i.e. kinesthetic skills, sign language and finger spelling ets. These aids play a fundamental role for sign lingual. It can improve their communicative skills and enhance their capabilities of being collaborative. Low-Tech AAC does not require batteries or electricity. It involves both physical movements and low technology instruments such as picture boards. Data is displayed through word, pictures and drawings. High tech AAC requires more electricity as compared to low tech electricity. These can produce digitized speech. Examples of some of the AAC devices mentioned in an article in 2017 include, Pocket Go-Talk 5-Level Communication device, The Megabee assisted communication and writing tablet, Roloque2Go, Enabling Devices Tactile Symbol Communicator, GOtalk 9+, FAB Frenchay Alphabet Board, Lightwriter SL 40, Goosy Step Talk Communicator, Big Talk assistive communicative Technology, and Go Talk Express 32 Advanced communication Aid. All these are the learning motivated devices and a solution to articulation disorders as well as a good practice for neuromuscular problems. Cerebral Palsic people can have difficulty in using these devices. Their works and understanding all depends on prediction, but there is no improvement in their motor skills. Their own word generation capability cannot be improved. These AAC devices have been improved as there is increased space for social interaction of cerebral palsic with other people. In 2019, there have been developments in AAC by inculcating motor impairments for increase in cognitive abilities. There are also eye tracking technologies resulting in good communication.

3.2 Electronic Fluency Devices:

These devices are intended to improve the fluency of certain disorders. Mechanism involves recording of own sound and reception of sound with slight alteration on the behalf of the hearer. Electronic and display fluency displays are of two kinds, They are named as delayed auditory feedback (DAF) and Frequency Altered Feedback (FAF). Delayed auditory feedback (DAF) is received by fraction of a second. In "Delayed auditory feedback", sounds are heard with slight change in the pitch. Electronic and fluency disorders can be single component or multi-component. These devices are Speech easy, Speak for Less, Voice Amp and Casa Futura Technologies mentioned by British Stammering association in 2017. Specifications include good vocal practices that can be easily understood.

3.4 Fixed and Dynamic Display Devices:

Fixed display devices are the devices having fixed and static displays. These displays are called as communication boards. Dynamic display devices are touch screen devices. Talking keyboards refer to sound or calls on a telephone. In these devices, buttons with numbers, alphabets, names or else are written. They assist in understanding language in different perspectives. Speech then becomes vocal for a listening person or a hearer. Talking Keyboards are for vocal significance. They are relating to sound patterns and voice recognition of certain alphabets and how to understand them. Dynamic display devices are ongoing alphabets and pictures.

4 Case Study of Edie

Edie is not a healthy child, staying with her parents in house. She had practiced language learning skills at home with her parents and then she found her way to school as she is suffering from spastic quadriplegic (cerebral palsy). Due to this reason, she could not speak properly. She did not know ho to play with toys and how to speak about them? She could not speak properly with her parents as well. She had both vocal and cognitive disability. Our vocal ability depends upon our cognitive ability. For this reason, they had used a lot of such activates for this purpose to boost her capability of speech mechanism. They take start from 'eye pointing' technique. It was comfy for her to talk with her eyes about anything relevant and special she had been asking for. But internal urge asks her to speak more than that. An E-Tran frame was suggested for her own choices , wants and needs due to her good eye pointing skills. But as far as humanistic nature is concerned, she wanted to speak to be vocal in her communication as E Tran Frame was limited to her choice of expressions only. As it was a hard task for a cerebral palsic, she was introduced to repetitive exercises and practices. All, it depended on starting and improving her vocal ability. Her best practice was dependent on her cognitive understanding. She was practiced after looking at the photograph of the toys. The second practice was making eye contacts. She was to look at the toys and making eye contact with the person, to inform about the toy she wanted. In this way, the person recognized the toy and was given the same toy. In this way, she was capable to understand the symbols, 'more' and 'stop'. When she will be well adapted to eye pointing technique she will be adapted to 'eye gazing technology' as well in future. These techniques and technologies are for necessary eye pointing techniques to inculcate necessary skills in the children. She was then provided an electronic chair with switches on the chair. The 'switch' was to operate toys and activities. This switch operating was for a lot of different activities such as visualizing, toys, pictures and pressing buttons after recognizing objects. If she was not capable of switching with hands, she was supposed to do it with feet. This chair was provided with a tray as well. She needed a lot of practice on switching as it was a difficult task for a cerebral palsic. She was, then introduced to a Voice Output Communication Aids (VOCA). Its objective was to control domestic appliances such as lights, television, and mechanisms such as electronic curtain rails and door openers. As far as Picture appearance and visual activity (Effect gained) If the performance of Edie is not going good, for example, she was capable to understand

picture of banana on Saturday, but on next day, she forgot it, more" build" activities should be introduced. It was done in case of her incapable performance. For making the activity more convenient, a picture was distributed into different sections. At first, she pressed different sections of a picture, and a picture appeared for the girl to

5 Case Study of Toby

Toby is having lack of cognitive ability. He is visually impaired and has partial hearing, symptoms of the disease of spastic displegic and controlled hydrocephalus. He is attending a nursery and is assited by his worker. This disease creates hurdles in brain development, inhibits brain nourishment, a child cannot see properly, the basic pictures, frames and graphs, ven he cannot see properly the assistive device. The student is non-helping in his understanding of hearing, as he is partially heard. Toby started practicing in communication at an early stage of sense acquisition. Toby was aided with his interest created devices and his se3ndual ability was motivated by sounds, by his favorite activities as he had been enjoying music, noisy and irritating games and other such activities. As the activities would be enjoying, more communication activities would be provided. The speciality of Toby is that he is hearing impaired but as irritating and noisy voices are harmful for healthy people, it becomes impressive and non-harming for him. For improvement in his communication feature, he was introduced to switch activities. In it, a switch was used to control toys operated on battery i.e. high tech speech based assistive devices. He was introduced to the activities such as noises and music. These activities were played on computer. He enjoyed these activities and was provided platform to understand language and sounds. The computer worked on picture changing and then he can listen to a tune which he can bring to his vocal capability at any stage of life. He was visually impaired. The problem he had with the computer was of adjustment. It was placed at an angle of being easily visualized. But he had problem with switch pressing. It needed to be more fixedly positioned. As a result of what he was recognized with a cause-and-effect software in the laptop. It had two functions; music was played after pressing the switch and animations. Laptops needed to be adjusted as he was visually impaired. Its purpose was related to the switch, after pressing the switch he was to watch and then to listen. For more strong speech and improvement in communication, he learnt a lot from "Build" activities. These build programs were for the purposes of cognitive enhancement, learning and displaying the learning material in the form of Toby's presentation. In build programs, there was sectional display of the sections of a picture in the form of photograph that can be resulted into the animation. He became interested in laptop screen. Due to his interest, music programs were introduced. He was then introduced to "Touch Screen". He was fulfilled with good fine motor skills. There was improvement in communication skills and choice making activities. There are visual and aural messages at AAC devices. Big Mack is a kind AAC device which was used with such baby. It is a simple aid of communication and a single message is recorded in it. This message is played back when the button is pressed. Toby used Big Mack at home and at nursery. Simple messages were recorded with a photograph placed on the top of BigMack. BigMack was used to indicate the recorded message. He enjoyed pressing BigMack. All his working dependent upon his expression which was relevant to enjoyment. Understanding phrase and spoken message was unclear for him. He was given bigMack for different activities such as choice of words or others such tasks. It also helped him a lot in differenti8ating things and other such items. Until yet, he need a lot of focus, concentration and attention for his diverted capability.

6 Recommendation(s)

Improvement in providing modern equipment in case of Downs Syndrome is required according to a research report of 2018 mentioned in a collection of article by ASHA. Computer generated pictographs were used

for students with certain impairments. After a case study at a 4-year child, there was still need for will to communicate in a 4 years child. In a survey for one year old child, web based survey (Joystick) resulted into cognitive and functional disabilities. There is still need of designed strategies for Down Syndrome There should be combination of various methods of communication for development in the techniques of being vocal according to Crews and Foreman. There should be some improvements in picture based strategies. More development pictures, such as messages should be conveyed through abstract arts and paintings for motivational practices of the students/children. Core Vocabulary technique should be improved by inculcating or sectioning words into different parts, so that can be convenient for the students. As very few people are capable to understand at a very low level, there is need for such students to get to know3 about more knowledge and degree level understandings. Such technologies should be introduced at an advanced level, so that such children can communicate at higher level.

7 Conclusion(s)

In this modern era, the desires for such ones, fail to communicate. It is just like a drowning man catches at a straw. Technologies related to visual impairment, hearing impairment, and dumb ones can lead to strong vocal capabilities in the form of whole statement and phrases. Socialization is demonstrated as a first skill for such persons to achieve a speech and then transform it into a language. In a statement analysis, words are understood by combining cognitive sections into one form. It all depends on the neural understanding of one's system. Socialization for such person is important to be taken into consideration, because after understanding a speech it comes to communication at an internal level i.e. among child and physical object interaction, among child and parent interaction and among group interaction. There are certain speech based assistive technologies, although for this purpose but with certain progressive development and advancement in it. These modern technologies are still at the risk of more improvement as students are still negligent after learning. Speech based assistive technologies are good as learning strategies.

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