

## Part II:

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### Activities and Outcomes

An augmentative communication evaluation was performed as well as a computer accommodation evaluation. The speech pathologist notes his speech is intelligible when it is loud enough to be heard. For that reason, amplification systems were considered rather than synthesized voice output communication devices.

#### OPTIONS CONSIDERED/SPEECH

Two amplifiers were demonstrated during the evaluation; the Rand voice amplifier and the ESE Speech Enhancer. The Rand amplifier was successful in amplifying his voice in very quiet conditions, but was not capable of providing sufficient amplification when there was even minimal background noise. When turned up to its maximum volume, the sound broke up and interfered with intelligibility.

Assessment procedures for the Speech Enhancer included careful measurement of the differences in Jack's speech intelligibility between the Speech Enhancer and the Rand amplifier, both in quiet and in noisy backgrounds. Jack also walked around with both devices, assessing the portability of them as well as his ability to walk and talk simultaneously without breathlessness.

#### RECOMMENDATIONS/SPEECH

1. The Speech Enhancer is a voice processor, which selectively amplifies certain frequencies of voice, thereby improving the sound of speech, particularly in noisy environments. It has a wider range than many portable amplifiers, enabling the user to boost the amplification significantly without distortion. While larger than the Rand, it can be worn as a waist-pack for ease in transporting.
2. Three microphones were tried with the Speech Enhancer and James found that the over-the-ear microphone was most comfortable and provided the best sound. He benefited also from the monitor feature on this microphone, in which he received direct feedback of his voice into an earphone. He indicated that having the direct feedback enabled him to monitor his own voice output, therefore exerting less effort to project his voice.

#### OPTIONS CONSIDERED/COMPUTER

Jack had been using a standard keyboard using all fingers of his left hand in a modified touch-typing fashion. However, his typing speed was decreased and his left upper extremity became fatigued with extended computer use. He tried several "miniature" keyboards in an effort to decrease the travel distance, which must be covered by the left hand. Keyboards evaluated included the Datadesk Little Fingers, Maxim, Datalux Spacesaver Desktop Model and Flat Model, and Datadesk Smartboard. However, the smaller size of these keyboards did not facilitate improved access.

Jack was also introduced to KeyRep word prediction software, as a potential means of increasing his typing speed and efficiency. However, during a timed typing test, he demonstrated an average typing speed of 22 words per minute, which is well above the 12 words per minute or less that is generally cited as the range that is most benefited by use of a word prediction program.

For mouse emulation purposes, he was introduced to the Kensington 4-button Turbo Ball, as he was currently using a Kensington 4-button Turbo Mouse Trackball (the Macintosh-compatible version of the Kensington 4-button Expert Mouse Trackball). However, Jack felt his hand positioning was more comfortable and functional using his present trackball device.

Finally, Jack was introduced to an advanced rate enhancement program, Instant Text!, which is currently available for the PC platform. Although it was determined this would be beneficial in increasing his typing speed, further investigation revealed that there were no comparable software programs available (in 2001, the time of this evaluation) that were compatible with the Macintosh operating system. Jack requires a Macintosh platform because of the music development and graphics software that he needs for his work.

#### **RECOMMENDATIONS/COMPUTER**

1. Instead of the miniature keyboards tested, Jack benefited from the lighter key touch of a wireless keyboard. The Acer Airkey Wireless Keyboard was selected. With the use of this keyboard, he was able to activate the keys with decreased effort, which led to greater activity tolerance and decreased fatigue and pain.
2. To enhance direct text input, Jack began using the Macintosh Accessibility feature, Sticky Keys, which helps to decrease the number of keystrokes required for multiple keystroke functions (i.e. capitalization).
3. Positioning for computer access and performance were enhanced when Jack was seated according to basic ergonomic principles in an adjustable office chair. After several models were tested, the Hermann Miller Aeron Highly Adjustable Work Chair was selected as it affords a wide range of adjustable options.
4. Jack further benefited from bilateral ErgoRest forearm supports with standard forearm pads. These adaptive devices helped to support his upper extremities and allowed him to move and utilize his left upper extremity for information input with increased ease and comfort. This, in turn, improved his overall physical tolerance and decreased his fatigue when typing at the computer for extended timeframes. Even though Jack does not utilize his right upper extremity for typing or mouse emulation purposes, he benefits from the use of the ErgoRest for his right forearm. This is because the body tends to tighten the muscles surrounding the shoulder joint as protective mechanisms after injury, thus increasing pain and fatigue over time. These effects are not only felt in the right upper extremity, but can contribute to pain and fatigue in the entire upper body.

### **COST ANALYSIS**

1. Since Jack was anticipating surgery for further repair to his vocal cords, Woodrow Wilson Rehabilitation Center was able to provide a rental from their “library” for 6 months. The Speech Enhancer can be purchased for approximately \$6000.
2. The over the ear microphone is included in the price of the Speech Enhancer.
3. Macintosh Accessibility feature, Sticky Keys, is standard on Macintosh operating system software.
4. Airkey Wireless Keyboard with Integrated Pointing Device, by Acer Peripherals, was found at CompUSA Superstore for \$50.
5. A USB adapter was needed to make the keyboard compatible with Macintosh. This was ordered from Safe Computing for \$51.19. (Order #AC010USB, toll free 800-245-6610.)
6. ErgoRest Articulating Arm Supports were purchased from Alimed for \$130 (1-800-225-2610) but can now be found at [www.ergorest.nl](http://www.ergorest.nl) for approximately \$89, including shipping and handling.
7. The Herman Miller Aeron Highly Adjustable Work Chair comes in multiple sizes and needs to be measured. Jack’s chair is from Chasen’s Business Interiors in Richmond, Virginia and cost approximately \$739. Their number is 804-673-7500.
8. A trial of voice therapy was recommended, pending approval by his surgeon.
9. Jack also expressed interest in counseling, to enable him to deal effectively with his losses.
10. While not medically or vocationally necessary, it was recommended that a rehab engineering consult be made to assist him with determining how to transport and set up his drum set.

### **FOLLOW –UP/OUTCOMES**

Jack used the rental ESE Speech Enhancer up to the time of his surgery and reported it was very successful. During recovery from the voice surgery, he returned to the use of an electrolarynx, which had also been recommended and used while he was recovering from his initial surgery. Further follow-up for evaluation of the need for the amplifier long-term will be made once he the healing process if complete.

Jack continues to work with vocational rehabilitation to identify options in his chosen career of developing sound tracks for films and other related occupations.



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