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Computer-based Speech Therapeutic Intervention

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ABSTRACT

A computer-based speech training system for young children with articulation delay was evaluated. Treatment subjects trained with /r/ control trained with /t/ pronouncing the word "train" for 36 weeks. Subjects in each treatment and control group were trained 18 times for 30 min per session. This training was delivered by software for articulation training and recorded by 18 training sessions over 6 weeks were scored by SLPs. At the end of each week, subjects were compared on the effectiveness of treatment and control. The study showed that treatment subjects were significantly more effective in improving speech compared to control subjects. Overall, the results support the use of computer-based speech training systems for young children with articulation delay.

INTRODUCTION

The present work is intended to address the expanding demand for speech therapy services for children who are not able to receive adequate therapy in the traditional setting. The Speech Therapy, Assessment, and Remediation (STAR) system is a computer-based speech therapy system developed to provide professional speech therapy in a more efficient and effective manner. This system uses a speech-training component to guide children through a sequence of increasingly more difficult levels, based on the words associated with each level. Progression through the levels was determined by the words associated with each level. In the following, we describe briefly the evaluation study and its results.

METHOD

Subjects:

- 32 children (6 with 7 years old or older)
- 21 children with articulation delays related to syllable-initial /r/
- Not receiving therapy
- Due to drop-outs, final group was 18 Ss: 6 females & 12 males
- 10 in 'treatment' group & 8 in the control group
- Ages ranged from 56 to 84 months (mean 77.5, SD, 10.3)
- Procedure:
  - 6-week study
  - 1/2 hour SLP intervention per week (all Ss)
  - 3 computer training sessions per week (40 min each)
  - Treatment Ss trained on /r/ - /w/ contrasts
  - Control Ss trained on /t/ - /k/ contrasts
- Apparatus:

The speech training system was an extension of the system described by Bunnell, Yarrington, and Polikoff (2000). It comprised a game-like computer interface that presented a cartoon character with which children interacted automatically. Figures 1 through 3 illustrate the three activity screens associated with the game which is set in a spaceship.

A brief review of computer-based speech therapy systems is necessary. Computer-based speech therapy systems have been developed to provide professional speech therapy in a more efficient and effective manner. The Speech Therapy, Assessment, and Remediation (STAR) system is one of the best developed systems that can be used in the traditional setting. This system uses a speech-training component to guide children through a sequence of increasingly more difficult levels, based on the words associated with each level. Progression through the levels was determined by the words associated with each level. In the following, we describe briefly the evaluation study and its results.

RESULTS

Data for the 2070 probe words were expressed in terms of the proportion of correct responses each word received from the 4 or 5 raters who heard it.

There were differences among the probe words such that some words were overall, less frequently rated correct by the judges. Figure 4 shows the proportion of correct judgments recorded for each of the 18 probe words. These differences were more difficult for these children than were words with syllable-initial /r/. The /r/ in the /gr/ cluster of graveyard was classified correct more frequently than any other /r/ segment.

DISCUSSION

Computer-based speech therapy systems have been developed to provide professional speech therapy in a more efficient and effective manner. The Speech Therapy, Assessment, and Remediation (STAR) system is one of the best developed systems that can be used in the traditional setting. Although this study lasted only six weeks and involved only one half hour traditional therapy session per week, three subjects in the treatment group made substantial improvement in /r/ production, and a fourth subject may have been starting to acquire /r/ toward the end of the protocol.

In addition to showing potential for efficacy as a speech training aid, we would emphasize the potential value of the data obtained by computer-aided speech training systems. In particular, it is noteworthy that:

- Detailed records of activity and progress are available to help a supervising SLP (e.g., Figure 7).
- Broad classification of performance in terms of the maximum level at which a certain level of performance can be maintained provides useful summaries of performance (e.g., Figure 6).
- Large amounts of speech data are recorded during the training and provide specific examples that a supervising SLP can review to inform clinical decisions.

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To further examine this, Figure 7 shows series-by-series performance for /r/ (and for comparison /s/) throughout the experiment. The plot for /s/ is characteristic of a child who is succeeding with this task by running the game up to the highest level frequently, especially in later sessions. This figure also suggests that /s/ was beginning to reach higher levels of difficulty in sessions later in the session.

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