

Treatment of Speech-Language Disorders & Stuttering with The Apex Speech Care System[®]

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Roy Sarfati is the inventor/developer of the **Apex™ Speech Care System**. This is a unique situation given the fact that Mr. Sarfati is a Board certified speech-language pathologist, and the developer of a treatment system for Neurogenic Speech-Language and Communication Disorders including Cognitive dysfunctions, Memory loss, Stuttering and other related disorders. His research in the field extends over a decade.

Overall Objectives:

- **Development of effective treatment protocols**
- **Formulation of advanced computerized application techniques, in a concentrated format.**
- **Development of clinical systems (software & hardware) for its application and long term, stable, high retention levels.**

Goals:

1. **To formulate a treatment protocol that combines several fluency shaping techniques that address the relevant physiological and related cognitive-emotional symptoms to Speech-Language disorders and stuttering:**
 - a. **Principal Behaviors**
 - b. **Ancillary Behaviors**
 - c. **Communicative Anxiety and Reactions of Others**
2. **To develop and adapt an effective concentrated treatment method with the required application systems (hardware and software).**
3. **To determine why existing treatments failed to maintain adequate post-treatment long-term high levels of retention.**
4. **To achieve and maintain a constant high post-treatment retention level of 80% or greater.**
5. **To test treatment protocols on a small group of study participants diagnosed with speech, communication disorders and stuttering.**
6. **Long term (12 to 18 months) follow-up post treatment of the study group.**

Research Structure:

A Research and Development Team (R&D Team) was formed with the specific goal to develop a practical, implemental, cutting edge effective treatment method with adequate application systems. The primary consideration in creating the Apex Speech Care

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System was to set the highest possible standard in the field of communication disorders treatment. The composition of the R&D Team is as follows: a speech language pathologist, a neurologist, a psychologist and a team of computer engineers educated in a wide range of disciplines (including a voice recognition expert [DSP engineer]).

The speech language pathologist had a vast rehabilitation experience. As such he tested first hand all available treatment methods. This provided a unique first-hand insight into the research and the formulation of the treatment protocol. The R&D Team tested fluency shaping techniques at all levels and methods of application in order to formulate the most effective combination and concentration ratios.

A long term **Study and Research Group** was formed, consisting of five individuals (All adults) with different levels of stuttering severity without any pre-existing medical conditions. Two of them had previous stuttering treatments with different methods. The Study Group was segregated from the Focus Group during the entire R&D phase.”

Also, a **Focus Group** composed of five adults (four males & one female) who had previous speech treatment was formed. Their retention levels from previous treatments ranged between 17% to 28%. One member of the focus group members was still using an online maintenance program. Four of the members were employed full-time and one was completing a graduate course. The speech language pathologist supervised the focus group and they met weekly for a three month period.

The **Focus Group** was asked to discuss the following topics:

1. Treatment expectations: the consensus was that any treatment must be effective long term, short in duration, innovative in concept, with a progressive application system.
2. Post-treatment maintenance and support program: This part of the treatment program generated opinionated discussions within the focus group. The emerging consensus among the participants was that the post treatment maintenance and support program must be motivating, and multi-dimensional, or else it will not generate a constant level of interest to preserve regular usage to maintain a constant high retention level.
3. Program’s Integration with a busy lifestyle: the groups expectations were constant availability, flexibility, and user friendly.

Systems architecture, Methodology, and Clinical Profile:

The method is a Concentrated Fluency Shaping & Communicative Anxiety Management. To apply this new method, the team of experts developed state of the art systems for clinical and home applications. The equipment is multi-faceted, scientific, non-invasive, and exclusive to the Apex™ Speech Care System (Patent & trademark granted in 2007). The components of the system consist of monitoring equipment, Apex

Speech Care System software, Apex database, and Apex configuration tool. The Articulatory Laryngeal Lab (ALL) is a specially designed processing center that analyses all the data collected during patient interaction and provides biofeedback in real time.

Equipment:

- Electrolottograph.
- Respiratory Displacement Sensors.
- Simultaneous Voice & Respiratory Signals Processing Center.
- Automated Digital Monitoring & Calibration Systems.
- Performance tracking & auto-corrective “Expert System”.
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The System’s technology components:

Clinical use:

The Articulatory-Laryngo-Lab. This data center interfaces with all phases of the Concentrated Application Program software, relays accurate biofeedback, and incorporates data from all major areas of concern necessary for corrective therapy. It provides:

- Muscle Tension Identification
- Respiratory Pattern Analysis
- Laryngeal Activity Monitoring
- Voice tension Recognition and Analysis
- Biofeedback in real time
- Instant Corrective Recommendations
- Speech Pattern Recognition and Analysis

Home use:

Maintenance & Support Phase consisting of two programs:

- The Ace . A computerized program that incorporates all the required exercises to effectively maintain a high retention level.
- “Roadside Assistance”. An audio CD that provides exercises on the go or in the event a computer is not available.

The ACE incorporates an “Expert System”, that is continuously updated. It provides the following:

- Unlimited and unrestricted practice availability.
- User-friendly, interactive, and auto-corrective program (in real-time).
- A performance-tracking system with auto-updating capability.
- Online support and monitoring via the Expert System.

Treatment Protocol phases:

Neurological evaluation

- Determination of pre-existing neurological condition(s)

Speech Dysfluency Evaluation

- Types of Dysfluencies: Within word/Between word/Sound prolongation/Word repetition/Syllable repetition
- Frequency of Dysfluency
- Severity of Stuttering/Duration
- Onset of negative reactions
- Articulatory Muscle Tension Identification
- Respiratory Pattern Analysis
- Laryngeal Activity & Vocal Monitoring
- Voice Stability Analysis

Psychological Assessment

- Communicative Anxiety
- Self-Esteem
- Family Dynamics
- Academic & Social Regression

Clinical Application:

Physiological Treatment (40 to 70 hours or more depending on severity level)

- Correction of articulatory instability
- Correction of articulatory incoordination
- Adaptation of respiratory-phonatory coordination
- Dynamic Motor Speech Optimization
- Correct & Control Skills

Psychological Treatment (As required)

- Social Interactions/Withdrawal
- Academic Regression
- Family dynamics
- Latent or overt anxiety symptoms
- Coping Strategies dealing with Negative Reactions of others

System's Functions

- Correction of articulatory instability and respiratory incoordination.
- Communication anxiety management.
- Motor speech optimization.
- Auto-corrective & diagnostic system with biofeedback.
- Post-treatment Maintenance & Support.

System's Biofeedback (in real time)

- Articulatory Muscle Tension Identification.
- Respiratory Pattern Analysis.
- Laryngeal Activity & Vocal Monitoring.
- Voice Stability Analysis.
- Individualized Performance Summaries & Recommendations.

Integrated Speech Corrective Functions:

The various functions incorporated in the software and hardware of the Apex Speech Care System are as follow:

1. Syllable Extension
2. Gradual Voice Initiation
3. Optimal Breathing Pattern

These functions are incorporated into an Exercise Menu, Sound Group Information Screens, Voice Graph, Vocal Cord Graph, Exercise Time, Breathing Meters, Tension Meters, Word Display, Corrective Message Display, Score Board, and a detailed Performance Summary with Individualized Recommendations after every practice session.

The system's software is a custom designed analysis and biofeedback program that is used to analyze the voice, vocal cord, and breathing activities of the patient during exercise sessions. The system's database consists of configuration data as well as a collection of inputs used by the software during the exercise sessions. The database is standalone and each treatment unit has an independent copy of the database. The system's configuration tool is used to read and set the configuration parameters that are associated with the voice, EGG (electroglottograph), and breathing analysis on an individual basis. Language choices are English or Spanish.

Conclusions:

1. **The data proved that the multi-directional fluency shaping techniques applied in a concentrated form were successful in achieving a reduction of stuttering and other speech disorders between 91% and 97% at completion.**
2. **The application period consisted of 6 consecutive days for 8 hours, 1 day off, and another 2 consecutive days. Each day was divided into 20 minutes sessions with a 10 minutes recess for discussion.**
3. **The maintenance and support program given to the participants for home application showed that after 12 months the participants who used it on daily basis for a 20 minutes session had a consistent retention level of 83% to 94%.**

PEER REVIEW -- FINAL ANALYSIS

Reviewer's Evaluation: SCORE: 27/ 30

VI. Final Analysis

A. The most important strengths of this system:

1. The Apex Speech Care System is a unique and cutting edge method and technology that is state of the art. It has combined the most advanced technology and clinical data into to the first stand alone system that is highly effective.
2. The Apex Speech Care System is a very powerful tool in the treatment of speech disorders and stuttering resulting in an effective retention ratio greater than 90% at completion (Eight to Ten days).
3. The Apex Speech Care System Post-Treatment Maintenance Program is very effective and assist in maintaining a consistent retention rate of 83% to 90%. This rate is higher than any other program available.
4. The Apex Speech Care System is the only bi-lingual system available: English and Spanish.
5. The system is user friendly.

Sincerely,

L. Cass Terry
