Motor Skills Tracking Tool

Description of exercise-Motor Learning Stage for current task

<table>
<thead>
<tr>
<th>Early</th>
<th>Developing</th>
<th>Stable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbal/cognitive stage</td>
<td>motor learning stage</td>
<td>automatic stage</td>
</tr>
</tbody>
</table>

Practice Structure

<table>
<thead>
<tr>
<th>constant</th>
<th>varied (varied parameters)</th>
<th>blocked</th>
<th>random (targeted tasks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>internal:</td>
<td></td>
<td>external:</td>
<td></td>
</tr>
</tbody>
</table>

Task Complexity:

<table>
<thead>
<tr>
<th>Simple</th>
<th>moderate</th>
<th>complex</th>
</tr>
</thead>
<tbody>
<tr>
<td>feedback guide</td>
<td>more feedback (new learner)</td>
<td>fade feedback</td>
</tr>
</tbody>
</table>

Reference for correctness:

<table>
<thead>
<tr>
<th>feedback guide</th>
<th>extrinsic feedback/ KR</th>
<th>intrinsic feedback increases</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No error detection</td>
<td>emerging correction</td>
</tr>
<tr>
<td></td>
<td>KR</td>
<td>begin to fade feedback</td>
</tr>
</tbody>
</table>

M. Rosenberg, 2010

Marci D. Rosenberg, BM, MS, CCC
University of Michigan
Overview

Traditional voice therapy exercises use a multitude of semi-occluded vocal tract exercises to enhance voice production. Several variations of these exercises will be introduced in a workshop format.

Objectives

The goal of this presentation is to:

• Provide an overview of the theoretical basis and physiology behind semi-occluded VT exercises
• Introduce several variations of these exercises including why, when and how to use them in voice therapy.

Semi-Occluded exercises (high resistance to less resistance)

1. Use of straws & tubes
2. Fricatives
3. Resonance hums
4. Closed vowels

Adaptations & Variations

1. Wave in a Cave
2. Straws and water bottles
3. /o/ buzz- inverted megaphone
4. Card kazoo

Materials

The following are a list of helpful items to use in voice therapy:

• Stirring straw
• Drinking straw
• Styrofoam cup

Resources

Vocology The Science and Practice of Voice Habilitation (2012) Ingo Titze & Katherine Verdolini Abbott, NCVS
Exercises for Voice Therapy 2nd Ed (2013), Behrman & Haskell
National Center of Voice and Speech website- [http://www.ncvs.org](http://www.ncvs.org)

Marci D. Rosenberg- marcied@umich.edu
Basic Terminology:

Motor Skill- proficiency demonstrated when performing a movement
Cognitive skill- proficiency demonstrated when deciding how to execute an action
Motor Performance- result of performer completing a motor skill; can be impacted by variables such as fatigue
Motor learning- changes, which occur as a direct result of experience and practice
Verbal/cognitive stage- early stage of learning, establishing feel of movement, ore cueing, errors
Motor Stage- longest stage, focus is on refining skills, better organization of movement pattern
Automatic stage- fast processing, significantly reduced errors, correction, longer program sequences

Practice Structure:

Distributed practice- shorter duration, longer rest period in between
Blocked practice- Only one motor skill is practiced, with consecutive repetition of skill
Random practice- multiple skills are practiced in random order, consecutive repetition of same skill is reduced compared to blocked practice
Constant practice- learner only rehearses one variation of a skill (ie no change in volume, key, speed, range)
Varied practice- learner rehearses different variations of a skill during a given session, promotes flexibility and generalization of skill
Forgetting Hypothesis- producing random repetitions of various motor skills, non-consecutively allows the brain to forget, thus re-enforcing the learner to “regenerate” a solution to the motor problem each new time. This re-enforces retrieval of the motor program, facilitation retention and learning.
Desirable difficulties- tactic used during practice to force the learner to increase errors during practice in order to promote more cognitive processing during the acquisition phase of learning. Performance is typically decreased during acquisition but learning and retention is increased
**Cueing & Feedback**

**Intrinsic** - Exteroception (auditory, visual), Proprioception (movements of muscles and joints)

**Extrinsic** - sensory information coming from outside of the body (verbal cues, biofeedback) Teacher controls extrinsic feedback

**Knowledge of results (KR)** - Tells performer information about how close they came to the desired movement outcome. Can be redundant with intrinsic feedback. Learner must be able to provide own KR early in learning.

**Knowledge of Performance (KP)** - Tells performer something specific about the quality of movement produced

**Internal focus** - Learner focuses on movement within body when executing movement goal—may be useful in early stage.

**External focus** - Learner focuses on end result of movement (send tone across room). Reduced conscious processing. Promotes automatic learning - switch to this early in skill acquisition

What is a Semi-Occluded Vocal Tract? These exercises have long been used in both the area of speech pathology, vocal pedagogy and vocal coaching. Described by Titze in 2006, an SOVT introduces some sort of narrowing somewhere along the vocal tract. This narrowing can occur at any supraglottic point along the vocal tract.

Why are SOVT’s useful for voice therapy? Use of a SOVT exercise improves vocal economy by creating an environment in which the resonances of the vocal tract interact productively with the airstream as it is valved by vocal fold vibration. The result is a neutralized level of adduction (not to pressed, not too breathy). Completions of these types of exercises engage all of the subsystems of voicing (power, source, filter, articulators). One of the benefits of SOVT’s is that there is a multitude of ways to do them, and they can be easily modified and adapted to meet the needs of different patients. Additionally, they provide kinesthetic feedback to the patient who can tune in to these forward, resonant sensations. This is useful for carryover for connected speech, which does not inherently allow for semi-occlusions.

How do SOVT’s improve vocal economy? When done correctly, SOVT’s maximize the interaction between the sound source (vocal fold vibration) and the filter (vocal tract). Very detailed explanations of the science behind how this happens are found in the resources provided in the front of this handout. Very simplified, the column of air above the vocal folds can be entrained to actually improve vibration of the vocal folds. This happens when the semi-occlusion creates increased acoustic pressure near the occlusion. This causes a backpressure of acoustic energy within the vocal tract, which is then re-directed back down to the vibrating vocal folds helping them to generate more aerodynamic power. This is then transmitted back up through the lips as acoustic power. When this is done in a productive manner, the result is sensation of vibration in the front of the face and an efficient, resonant voice production. However, when the sound source (aerodynamic energy) is not efficiently converted into acoustic energy, the result is sensation of vibration in the laryngeal region with a non-resonant quality.

When are SOVT’s useful in voice therapy? Because SOVT’s facilitate easy phonation, and are executed at low volumes they can be modified and used for almost any type of voice patient:

1. SOVT’s are very user friendly for Pts with vocal fold lesions
2. Many variation of SOVT’s are gentle enough to be used during post operative re-introduction of voicing (once cleared by otolaryngologist to initiate therapy-wound healing implications)
3. SOVT’s are very useful throughout the day as a voice calibrator
4. SOVT’s can be used after very active voice use as a cool down to reduce fatigue
5. SOVT’s can be helpful for the non-intuitive voice patient as a means of facilitating resonant voicing

Marci D. Rosenberg , MS CCC-marci@umich.edu