Motor learning utilizes “a set of processes associated with practice or experience leading to relatively permanent changes in capability for movement” (Schmidt & Lee, 1999)
• Used to promote retention, accuracy, and consistency of learned motor skills
• Contribute to ability to perform the same movements many times with little-no cognitive effort
• *Acquisition* is a first step, but performance during *acquisition* is *NOT* a good index of *retention*
• Skill is *performed* during practice
• Skill is *learned* if retained after practice
• Pace varies for each individual (age, etiology, severity, responses), so very important to USE CLINICAL JUDGMENT
• **General rule:** make things **difficult** in early learning to maximize the learning result.
• Cognitive-motor **challenges** appear to be the way to effective motor learning (Kent & Strand, 2007)
• Thus far, research suggests these principles used in limb motor learning and relearning can be applied for oral motor (re)learning also.

### Principle

<table>
<thead>
<tr>
<th>Practice Distribution</th>
<th>Better for Acquisition</th>
<th>Better for Retention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Few sessions, short time</td>
<td>More sessions, over time</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Practice Schedule</th>
<th>Blocked</th>
<th>Random</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small, regular intervals</td>
<td>Longer, variable intervals</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Phonetic context, prosody, rate in practice</th>
<th>Consistent</th>
<th>Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part of goal (/b/ in isolation 10x)</td>
<td>Specific to goal (bit, bat, bet)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Feedback Type</th>
<th>Knowledge of performance (tongue was too far out)</th>
<th>Knowledge of results (3 out of 4 correct)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extrinsic feedback</td>
<td>Promotes self-monitoring</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Feedback Frequency</th>
<th>Often</th>
<th>Rare, inconsistent, fade out</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Feedback Timing</th>
<th>Immediate</th>
<th>Delayed</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Attention Focus</th>
<th>Internal, Articulator oriented</th>
<th>External, Goal oriented</th>
</tr>
</thead>
</table>
Please use citation:
Hancock, A., Friedman, I. Schulz, S., Bamdad, M., Youmans, G. Youmans, S. (2008). What is motor learning and how can it help speech? *ASHA seminar, Chicago, IL.*

**Motor Learning Guided (MLG)**

Complete step 1 for entire set of 5 stimulus cards, then shuffle the 5 cards and proceed to step 2 for each of those 5 cards, shuffle and go on to step 3.

**Step 1:** Say together, then
- a. Client repeats once (if wrong, go back to saying together)
- b-d. Client repeats 3 times, with 4 second pauses between
  Clinician says it, waits 4 seconds, provides # correct out of 3 attempts.

**Step 2:** *(random order)* Clinician will verbally read card, wait 4 seconds, give Client card to read
- a. Client repeats once (if wrong, clinician says it again)
- b-d. Client repeats 3 times, with 4 second pauses between
  Clinician says it, waits 4 seconds, provides # correct out of 3 attempts.

**Step 3:** *(random order)* Client will read card aloud.
- a. Client repeats once (if wrong, tell client to try it again)
- b-d. Client repeats 3 times, with 4 second pauses between
  Clinician says it, waits 4 seconds, provides # correct out of 3 attempts.
  * Client will say it again without looking at card.
  * Shuffle 5 cards, then client will say phrases in response to a question from clinician.

**Step 4:** Repeat steps 1-3 with a different set of 5 stimulus cards

**Step 5:** Using both sets of cards (10 stimuli total), Client will read written card aloud *(random order).*
- a. Client repeats once
- b-d. Client repeats 3 times, with 4 second pauses between
  Clinician says it, waits 4 seconds, provides # correct out of 3 attempts.

*These steps are unique to Rosenbek’s 8-step continuum, but added to this MLG protocol*

**Scoring***: *(each) production is scored using an 11 point multi-dimensional scale*
- 11 Accurate with LESS than 5 second delay
- 10 Delayed MORE than 5 seconds
- 9 Delay with groping/posturing
- 8 Self-corrects
- 7 Phonemic distortion/s of one or more words with LESS than 5 sec delay
- 6 Phonemic distortion/s of one or more words with MORE than 5 sec delay
- 5 Needs stimuli repeated
- 4 Incomplete. Similar characteristics (e.g., # syllables) but not the target
- 3 Error with LESS than 5 sec delay
- 2 Error with MORE than 5 sec delay
- 1 Perseveration (produces previous response)
- 0 No response

*modified scoring suggested by Friedman et al. is different from LaPointe et al.’s scoring*
Please use citation:

### Set 1:

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>Step 1: In unison</strong></td>
<td>a.</td>
<td>a.</td>
<td>a.</td>
</tr>
<tr>
<td>a.</td>
<td>b.</td>
<td>b.</td>
<td>b.</td>
</tr>
<tr>
<td>b.</td>
<td>c.</td>
<td>c.</td>
<td>c.</td>
</tr>
<tr>
<td>c.</td>
<td>d.</td>
<td>d.</td>
<td>d.</td>
</tr>
<tr>
<td><strong>Step 2: Clinician, 4 seconds, then client</strong></td>
<td>a.</td>
<td>a.</td>
<td>a.</td>
</tr>
<tr>
<td>a.</td>
<td>b.</td>
<td>b.</td>
<td>b.</td>
</tr>
<tr>
<td>b.</td>
<td>c.</td>
<td>c.</td>
<td>c.</td>
</tr>
<tr>
<td>c.</td>
<td>d.</td>
<td>d.</td>
<td>d.</td>
</tr>
<tr>
<td><strong>Step 3: Client reads card</strong></td>
<td>a.</td>
<td>a.</td>
<td>a.</td>
</tr>
<tr>
<td>a.</td>
<td>b.</td>
<td>b.</td>
<td>b.</td>
</tr>
<tr>
<td>b.</td>
<td>c.</td>
<td>c.</td>
<td>c.</td>
</tr>
<tr>
<td>c.</td>
<td>d.</td>
<td>d.</td>
<td>d.</td>
</tr>
<tr>
<td>no card:</td>
<td>no card:</td>
<td>no card:</td>
<td>no card:</td>
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</table>

To question: To question: To question: To question: To question:

### Set 2 (Step 4):

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<table>
<thead>
<tr>
<th></th>
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<td><strong>Step 1: In unison</strong></td>
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<tr>
<td>a.</td>
<td>b.</td>
<td>b.</td>
<td>b.</td>
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<tr>
<td>b.</td>
<td>c.</td>
<td>c.</td>
<td>c.</td>
</tr>
<tr>
<td>c.</td>
<td>d.</td>
<td>d.</td>
<td>d.</td>
</tr>
<tr>
<td><strong>Step 2: Clinician, 4 seconds, then client</strong></td>
<td>a.</td>
<td>a.</td>
<td>a.</td>
</tr>
<tr>
<td>a.</td>
<td>b.</td>
<td>b.</td>
<td>b.</td>
</tr>
<tr>
<td>b.</td>
<td>c.</td>
<td>c.</td>
<td>c.</td>
</tr>
<tr>
<td>c.</td>
<td>d.</td>
<td>d.</td>
<td>d.</td>
</tr>
<tr>
<td><strong>Step 3: Client reads card</strong></td>
<td>a.</td>
<td>a.</td>
<td>a.</td>
</tr>
<tr>
<td>a.</td>
<td>b.</td>
<td>b.</td>
<td>b.</td>
</tr>
<tr>
<td>b.</td>
<td>c.</td>
<td>c.</td>
<td>c.</td>
</tr>
<tr>
<td>c.</td>
<td>d.</td>
<td>d.</td>
<td>d.</td>
</tr>
<tr>
<td>no card:</td>
<td>no card:</td>
<td>no card:</td>
<td>no card:</td>
</tr>
</tbody>
</table>

To question: To question: To question: To question: To question:
Script Training Procedure

1. Client-generated, relevant topics
2. Client and clinician write short scripts
3. Scripts divided into short phrases for training
4. 45-minute sessions, 2 times per week
5. Practice with tape recording at home 2 times per day, for at least 15 minutes per practice session
6. Script phrases were trained using a cueing hierarchy
7. 3 Scripts were practiced in a cumulative fashion

Cuing Hierarchy

For Acquisition: Block practice
1. Clinician modeled word/phrase
2. Client produced phrase in unison with clinician many times
3. Clinician gradually faded participation
4. Client independently produced phrase with cue card in place, 5-10 times.
5. Client produced phrase independently without cue card 5-10 times

After Stable Production: Random Practice
- Initiated when practice reached <90% accuracy for each phrase
  - Clinician pointed to cue cards in random order
- Random practice in conversation
- Homework: Shuffle cards before practice

Motor Learning References


Please use citation:
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Motor Learning References (continued)

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