Basic Sciences in GME
The Ultimate Setting for Being Two-Faced

David A. Morton, Ph.D.
Professor, Vice-Chair of Medical and Dental Education
Academy of Health Science Educators
Department of Neurobiology and Anatomy
University of Utah School of Medicine
Beginnings and Endings

Past

Janus

Future
An educator is like the Roman God Janus

Retrospective and Prospective

Reviewing past material

Teaching future material
What does this have to do with learning?
How do we make information stick?
The mind is like a storehouse
Memories are objects stored in that space
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Memories are objects stored in that space
Retrieval is essential for durable, long-term learning

Novel information A

Novel information B

Novel information C
Memory is retrieved, that memory becomes more accessible.
Encoding

Novel information A

Novel information B

Novel information C
Novel information A
Novel information B
Novel information C
Retrieval
What is Retrieval Practice?

- Activities that force us to pull knowledge “out” and see what we know
- … when we are forced to recall … we struggle to remember
- It’s precisely this “struggle” that improves memory and learning
- Therefore, Retrieval Practice…
  - Exercises and strengthens our memory
  - Identifies gaps in our learning
How many people here speak Swahili?

- Required participants to learn 50 Swahili vocabulary words
- Participants divided into 4 groups - learned in 4 different ways

1. Study once
2. Recall once
3. Repeated massed
4. Repeated spaced

- Tested recall of 50 Swahili words one week later
How well would students remember the vocabulary word translation?
Lecture new material for 10 mins

1. Retrieval Practice Activity … stuff you just taught them

2. Spaced Repetition …
   stuff you taught them 20 mins, 2 days, 2 weeks, 2 years ago
Retrieval within a lecture
Retrieval within a lecture
Retrieval within a lecture
Retrieval within a lecture
Retrieval within a lecture
Retrieval within a lecture
Retrieval within a lecture
Retrieval from previous lectures
Retrieval from previous lectures

1. Scapular sling muscles
2. Rotator cuff muscles
3. Brachial muscles
4. Intertubercular groove muscles
5. Forearm flexor muscles
6. Forearm extensor muscles
1. Scapular sling muscles
2. Rotator cuff muscles
3. Brachial muscles
4. Intertubercular groove muscles
5. Forearm flexor muscles
6. Forearm extensor muscles
Paper puzzles
Suprascapular nerve

Supraspinatus

Glenohumeral abduction (15°)
Axillary nerve

Deltoid

Glenohumeral abduction
Dorsal scapular nerve

Scapula retraction

Rhomboid major and minor
Suprascapular nerve

Supraspinatus

Glenohumeral abduction (15°)
Suprascapular nerve

Supraspinatus

Glenohumeral abduction (15°)
Glenohumeral abduction (15°)

Brachial plexus:

Glenohumeral joint

Acromioclavicular joint

Clavicle

Scapula

Upper arm

Biceps brachii

Brachialis

Brachioradialis

Triceps brachii

Radial nerve

Median nerve

Ulnar nerve

Cubital fossa
Axillary nerve

Deltoid

Glenohumeral abduction
Axillary nerve

Deltoid

Glenohumeral abduction
Dorsal scapular nerve

Scapula retraction

Rhomboid major and minor
Dorsal scapular nerve

Scapula retraction

Rhomboid major and minor
Student, Resident, Fellow ...
<table>
<thead>
<tr>
<th>Muscle</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biceps brachii</td>
<td>Glenohumeral abduction</td>
</tr>
<tr>
<td>Infraspinatus</td>
<td>Elbow extension</td>
</tr>
<tr>
<td>Brachialis</td>
<td>Glenohumeral abduction (15°)</td>
</tr>
<tr>
<td>Triceps brachii</td>
<td>Glenohumeral internal rotation</td>
</tr>
<tr>
<td>Supraspinatus</td>
<td>Glenohumeral external rotation</td>
</tr>
<tr>
<td>Teres minor</td>
<td>Glenohumeral external rotation</td>
</tr>
<tr>
<td>Deltoid</td>
<td>Subscapularis muscle</td>
</tr>
<tr>
<td>Suprascapular nerve</td>
<td></td>
</tr>
<tr>
<td>Radial nerve</td>
<td></td>
</tr>
<tr>
<td>Axillary nerve</td>
<td></td>
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<tr>
<td>Musculocutaneous nerve</td>
<td></td>
</tr>
<tr>
<td>Upper and lower subscapular nerve</td>
<td></td>
</tr>
</tbody>
</table>
Muscles:
- Biceps brachii
- Infraspinatus
- Brachialis
- Triceps brachii
- Teres minor
- Supraspinatus
- Deltoid

Actions:
- Glenohumeral abduction
- Elbow extension
- Elbow flexion
- Glenohumeral internal rotation
- Glenohumeral external rotation
- Glenohumeral external rotation
- Supraspinatus muscle

Nerves:
- Suprascapular nerve
- Radial nerve
- Axillary nerve
- Musculocutaneous nerve
- Upper and lower subscapular nerve
Foundational Activities
There are 4 trios below ... find them

- **2 on the left and 3 on the right**
- **Wider, shorter and more vertical than the left**
- **Contains “C” shaped cartilage rings**
- **Supplies a bronchopulmonary segment**

**A**

**B**

**C**

**D**

**i**

**ii**

**iii**

**iv**
There are 4 trios below ... find them

1° bronchus (main)
- Wider, shorter and more vertical than the left

2° bronchus (lobar)
- Supplies a bronchopulmonary segment

3° bronchus (segmental)
- Upper lobe
- Lower lobe

Contents: "C" shaped cartilage rings
One of these things is not like the others …
One of these things is not like the others …

- Pleural space (-5 atm)
- Type II Pneumocyte
- Rib
- Goblet cell
- Smooth muscle
- Cartilage
Do you know what the problem with teaching/learning is?

We always assumed it happened
In a Nut-Shell

- Retrieval practice = Effective & meaningful for long-term learning
- Retrieval practice + Repetition + Spacing = Optimal learning
- Retrieval practice is helpful when teaching new content and linking it with review content
When we think about learning, we typically focus on getting information **into** students' heads.

What if, instead, we focus on getting information **out** of students' heads?

*Retrieval practice* is a learning strategy where we focus on getting information out. Through the act of retrieval, or calling information to mind, our memory for that information is strengthened and forgetting is less likely to occur. Retrieval practice is a powerful tool for improving learning without more technology, money, or class time.

On this website (and in our free Retrieval Practice Guide), we discuss **how to use retrieval practice to improve learning**. Established by nearly 100 years of research, retrieval practice is a simple and powerful technique to transform teaching and learning.

In order to improve learning, we must approach it through a new lens – let's focus not on getting information "in," but on getting information "out."
Acknowledgements
Thank-you