A PROGRAM FOR TEACHING
PODIATRIC TOOL-SKILLS

BUILDING INCREMENTAL BEHAVIORS USING TOOL-
SPECIFIC LEARNING PLATFORMS AND A DETAILED
TEACHING PROCEDURE

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This work was supported by grants from OMeGA and the

Equipment donations: Stryker Corp. and Smith and Nephew, Inc.
Procedure vs. Tool skill
ABOS Grant Proposal

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<table>
<thead>
<tr>
<th>Tool Module</th>
<th>Sub-module (Simple Behaviors)</th>
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</table>
| Saw 1 (cast saw) | -RFT*  
-Plunge cut  
-Run cut |
| Saw 2 (oscillating)  
Fully incorporated TAG methodology | -RFT  
-Run Cut  
-Plunge Cut  
-Flush Cut |
| Saw 3 (reciprocating) | -RFT  
-Push Cut  
-Pivot Cut |
| Knife/Scissor | -RFT  
-Puncture  
-Incision  
-RFT  
-Cutting  
-Spreading |
| Suture  
Fully incorporated TAG methodology | -RFT  
-Square Knot (two hand)  
-(non-dominant)  
-Square Knot (one hand)  
-(non-dominant)  
-Slider Knot  
-Bowline  
-Suture Passing |
| Drill 1 (drill)  
Fully incorporated TAG methodology | -RFT  
-Dimple  
-Drill Hole  
-Angular Drilling  
-Plunge Avoidance |
| Drill 2 (screwdriver) | -RFT  
-Screw Placement  
-Over Drilling  
-Compression screw  
-countersink |
| Drill 3 (blind drilling) | -RFT  
-Single hand drilling  
-Angular drill to target  
-Perfect circles |
| Drill 4 (high speed) | -RFT  
-Straight lines  
-Circles  
-Keyholes  
-Cutting |
| Drill 5 (reamer) | -RFT for Acetabular Reamer  
-Plunge reaming  
-Side reaming  
-RFT for Cannulated Reamer  
-Tunnel cutting |
| Arthroscope+ Diagnostic | -RFT  
-Insertion  
-Quadrant visualization  
-Eyepiece rotation  
-Forward and back  
-Probe triangulation  
-Grasper |
| Arthroscope+ Manual Tools | -RFT  
-Straight Biters  
-Angled Biters  
-Suture Passers  
-Chisels and Rasps |
| Arthroscope+ Power Tools | -RFT  
-Arthroplasty system  
-Drills and Reamers |
| Osteotome | -RFT  
-Straight cut  
-Circular cut  
-Shaving and gouging  
-Channel cuts |
| Rongeur/Curette | -RFT  
-Front bite  
-Side bite  
-Rip  
-RFT  
-Side cut  
-Scoop |
| Compartment Pressure Monitor | -RFT  
-Monitor pressure |

**Montefiore THE UNIVERSITY HOSPITAL**

Albert Einstein College of Medicine 
OF MEDICA UNIVERSITY
... and Materials
... and Materials
... and Materials
... and Materials
• The total, one time, fixed equipment costs for all 16 modules was $1672/resident.

• The total, replaceable equipment (bits, blades, etc.) cost was $129/resident.

• The total, single use items cost was $154/resident.
AND NOW
FOR SOMETHING
COMPLETELY
DIFFERENT
A behavior is more likely to occur if it is reinforced.

-B. F. Skinner
Event Markers-as conditioned reinforcers
-precise
-judgment free
Teaching with Acoustical Guidance
TAGteach is a teaching procedure that uses operant learning methodologies (including a variety of conditioned reinforcers) along with a process known as chaining.
A PROGRAM FOR TEACHING ORTHOPAEDIC TOOL-SKILLS

BUILDING INCREMENTAL BEHAVIORS USING EVENT MARKERS, MODELING AND A SPECIFIC ARCHITECTURE FOR COMMUNICATION

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This work was supported by grants from the OMeGA and the ABOS.

Equipment donations: Stryker Corp. and Smith and Nephew, Inc.
Disclosures: KPCT and TAGteach International
A composite skill is a complex behavior.
To achieve **fluency** with a complex behavior, that is, to create a behavior that has both accuracy and speed, each of the component behaviors must be fluent.
Surgical tool-skills are complex behaviors that can be broken down into component or foundation behaviors and those behaviors can be taught to fluency using operant methodologies; they then can be chained back together to form fluent, complex behaviors.
Methods...

Rules for Tools

- Determine **point of action** (business end)
- Determine **grip** position possibilities
- Determine **stabilization** alternatives
- Evaluate the **controls**
- Determine the **power source**
Methods...

- **Building a Complex Behavior**
  - Background: *describe* the complex behavior
  - Background: *convey* its importance
  - Demonstrate the complex behavior

- **Component Behavior 1**
  - Describe the behavior
  - Demonstrate the behavior
  - Instruct the behavior
  - Repeat the *demonstration with the instruction*
  - Identify *tag point*
  - Practice and mark

- **Component Behavior 2**
• **BUILD** each foundation and/or simple behavior to fluency…

For behavior 1

- **DESCRIBE** the goal of the behavior i.e., “to properly position the suture limbs”
- **DEMONSTRATE** the behavior
- **INSTRUCT** i.e., “place 1/3 of the suture directly over 2/3 of the suture”
- **REPEAT** the demonstration with instruction
- **IDENTIFY** (with a cue or “TAGpoint”) the part of the behavior to be marked i.e., “over”
- **BUILD** the behavior in the learner to fluency, marked by the learning partner

• **BUILD and LINK** behaviors 2, 3, 4 and 5 until the complex-behavior is completed (chaining)
• **NAME** the “performance cue” for the complete behavior i.e., “build a Bronx Slider”
• **REPEAT** until fluency of the complex behavior is achieved, with rest and review as necessary
Performance Cues
Performance Cues

…‘tie a slider knot’
The goals of this project:

• To teach first year orthopaedic residents the fundamental tool-skills to fluency, using an operant learning and communication methodology, in a way that is positive, time efficient, reproducible and motivating and to

• Evaluate the operant learning and communication methodology.
Results

Test Group: 12 operant trained to tie slider

Control Group: 11 trained to tie slider with demonstration and exploded diagram

\[
p = \frac{(a+b)(c+d)}{a^n (a+c)} = \frac{(a+b)! (c+d)! (a+c)! (b+d)!}{a! b! c! d! n!}
\]

Significant for precision, \( p = 0.001 \)
Before a learner can benefit from self directed practice, that learner must achieve 50% of the performance fluency of someone fluent with the task.

-Carl Binder
Summary

- Positive **operant learning** enhances skill acquisition.
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- The TAGteach inspired **scripts** result in improved communication (teaching) skills between teachers and students and between students and students.

- With this method, behavior acquisition is precise, rapid and readily transferred from the laboratory to the operating room using “**PERFORMANCE CUES**.”
References