Diastolic learning: Making the tacit, explicit.

Low fidelity simulation models and deliberate practice.





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Logistical challenges

- European Working Time Directive
- Increasing complexity of cases
- Emphasis on operating room efficiency
- Emphasis on mitigating medical error



‘That-which-could-not-be-named’

- Pauline Chen M.D. ‘A vital measure: **Your surgeon’s skill**’. Oct 31, 2013. New York Times.
- John D. Birkmeyer et al. ‘Surgical Skill and Complication Rates after Bariatric Surgery’. N Engl J Med 2013;369:1434-42.
- Albert B. Lowenfels, MD. ‘Surgeons Are a Risk Factor for Anastomotic Leaks in Patients’ Medscape - Sep 21, 2017.



Acquisition of skills

Fitts PM, Posner MI. Human performance. Belmont, CA: Brooks/Cole, 1967.

Stage	Goal	Activity	Performance
Cognition	Understand the task	Explanation, demonstration	Erratic, distinct steps
Integration	Comprehend and perform mechanics	Deliberate practice, feedback	More fluid, fewer interruptions
Automation	Perform the task with speed, efficiency, and precision	Automated performance requiring little cognitive input, focus on refining performance	Continuous, fluid, adaptive

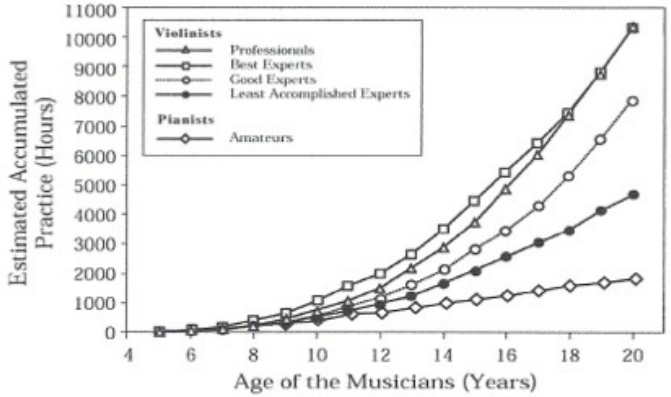


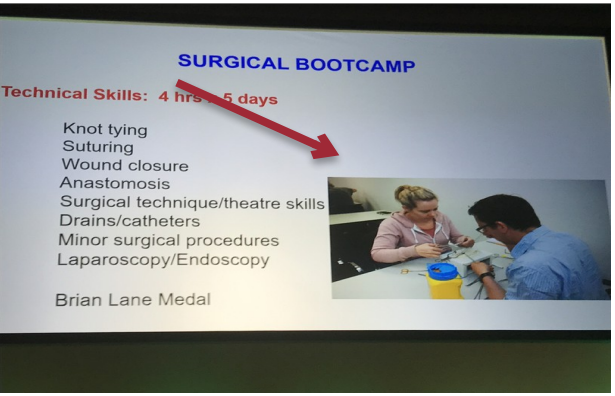
Figure 38.4. Estimated amount of time for solitary practice as a function of age for the middle-aged *professional* violinists (triangles), the *best* expert violinists (squares), the *good* expert violinists (empty circles), the *least accomplished* expert violinists (filled circles), and *amateur* pianists (diamonds). (From "The role of deliberate practice in the acquisition of expert performance," by K. A. Ericsson, R. Th. Krampe, and C. Tesch-Römer, 1993, *Psychological Review,* 100(3), p. 379

Ericsson, K. A., Krampe, R. T., & Tesch-Römer, C. (1993). The role of deliberate practice in the acquisition of expert performance. Psychological Review, 100, 363–406.

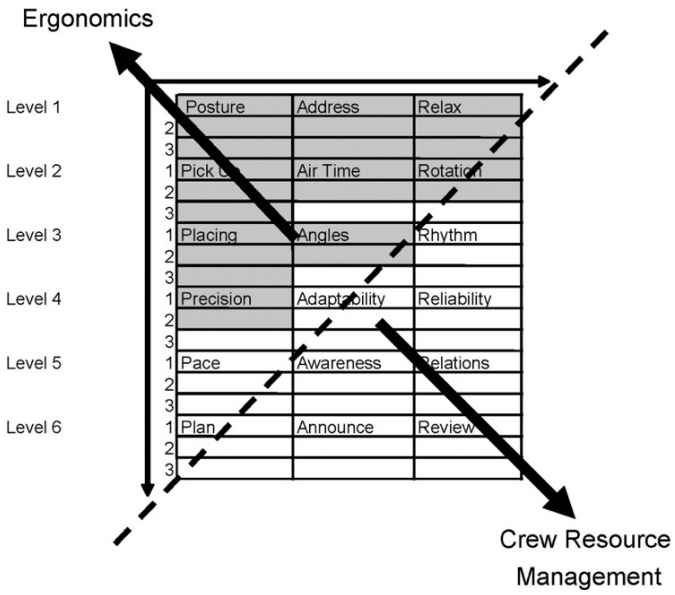
Deliberate practice



Courses


SURGICAL BOOTCAMP
Technical Skills: 4 hrs - 5 days
Knot tying
Suturing
Wound closure
Anastomosis
Surgical technique/theatre skills
Drains/catheters
Minor surgical procedures
Laparoscopy/Endoscopy
Brian Lane Medal




Ergonomics
Level 1
Level 2
Level 3
Level 4
Level 5
Level 6
Posture
Address
Relax
Air Time
Placing
Angles
Rhythm
Precision
Adaptability
Reliability
Pace
Awareness
Plan
Announce
Review
Crew Resource Management

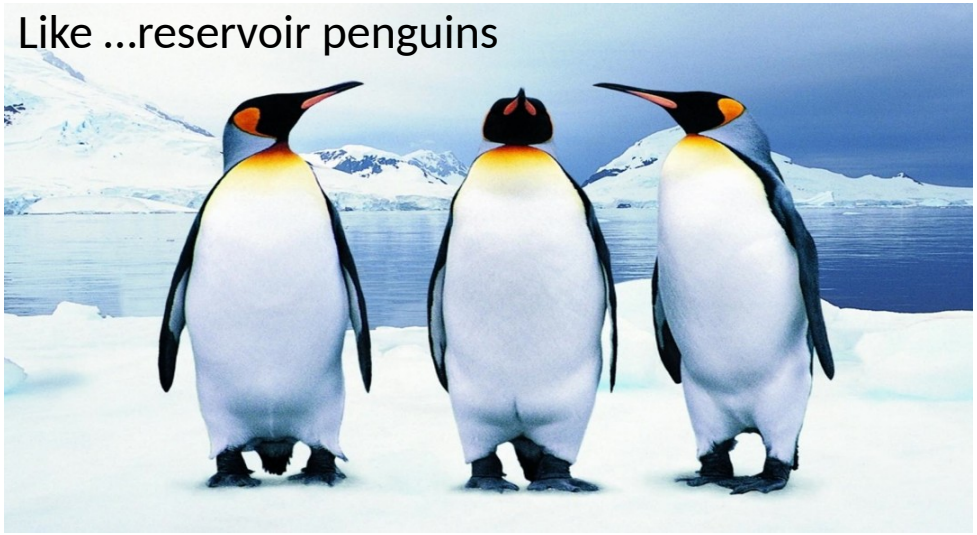

Yorkshire
Heart Centre
Wetlab

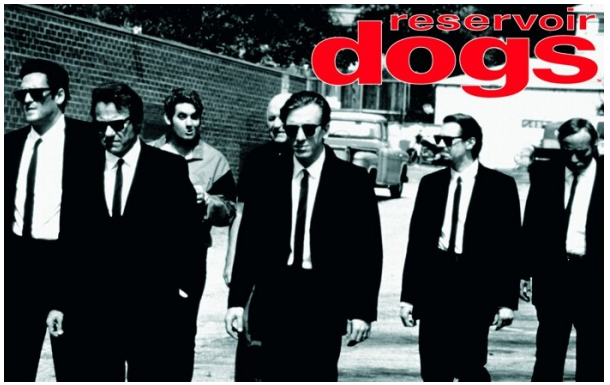

Yorkshire
Heart Centre
Wetlab

Surgeons should be cool

- Smooth surgery = safe surgery = fast surgery (relaxed)
  - Maintains stability of theatre environment
  - Enhances team confidence
  - Improves performance

Like …reservoir penguins

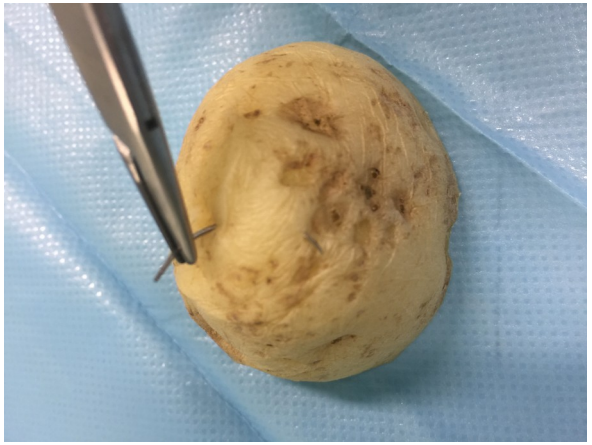


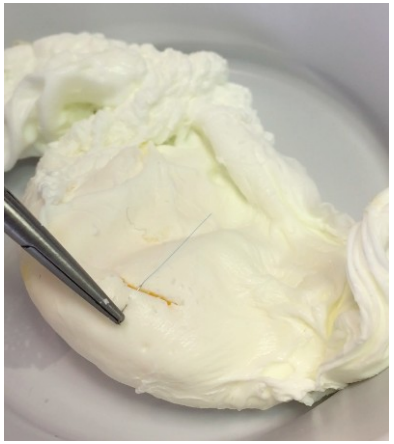


Not like extras from a Tarantino movie

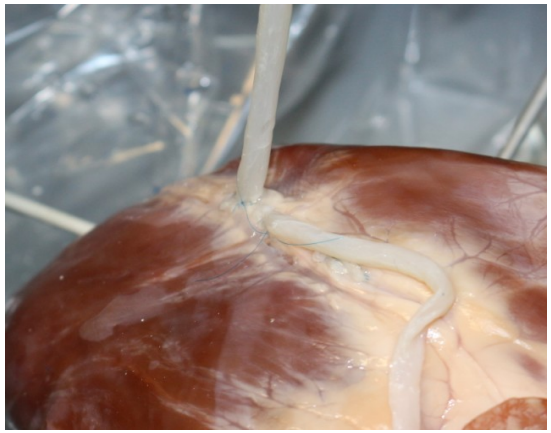
At home practice + wetlab

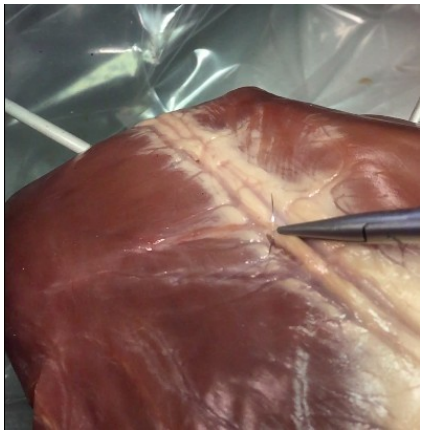
Low fidelity models can be useful for the early stages of training





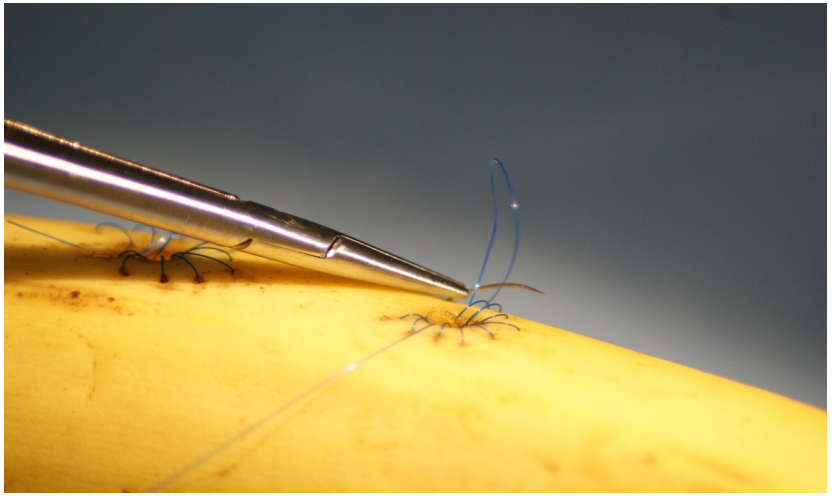






Aim

- Establish whether a combination of low fidelity simulation models and deliberate practice can reliably predict achievement of basic surgical skills competency.



Methods

- Recruitment Oct 2016 – June 2017. N=30 junior doctors, medical students.
- Materials: Ironing board, bananas, needle holders, sutures, video.
- Sequence of events: Demonstration session with trainer and initial video 1 week at home practice second video

The task

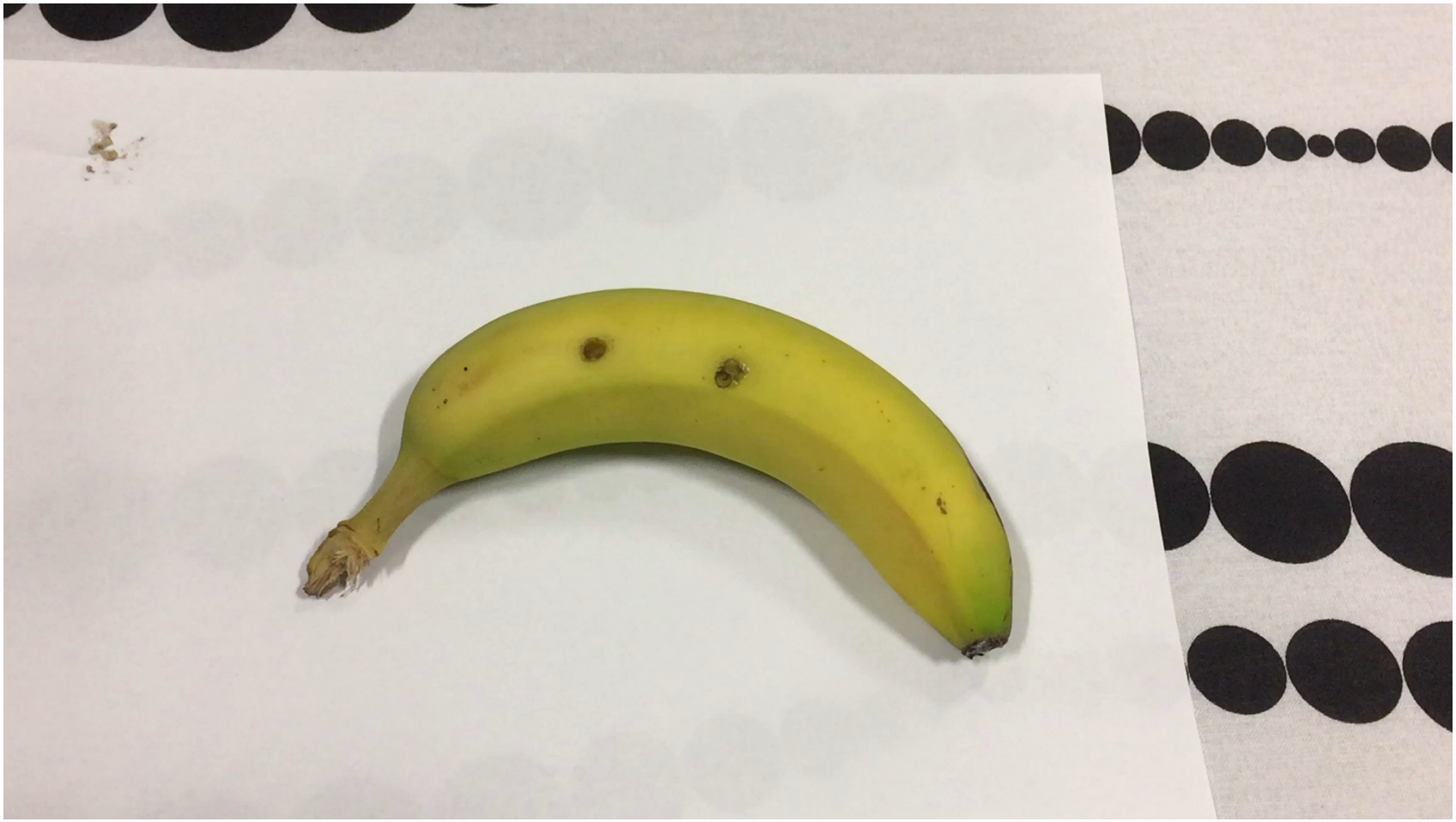
- Time
- Flow
- Precision
- Rotation



Diastolic learning 1 mov



Diastolic learning 2 mov



Results

N=30	1st attempt	2nd attempt	Improvement
Time mean, (range)	4:46 (3:41 – 5:30)	3:24 (2:03 – 4:18)	1mn22sec (28.6%)
Flow median (range)	5 (1 – 8)	3 (1 – 5)	2 (40%)
Precision median, (range)	8/12 (7/12 – 10/12)	10/12 (8/12 – 11/12)	2/12 (16.6%)
Rotation median, (range)	7/12 (6/12 – 9/12)	10/12 (8/12 – 12/12)	3/12 (25%)

Limitations

- Qualitative x 3 quantitative x 1
- At home practice of each participant not directly observed
- Descriptive statistics only
- Inter-observer variability

Conclusions and future goals

- Low fidelity simulation models can reliably be used to achieve significant progress through early stages of training at home.
- Demonstrates the principles that need to be observed in order for deliberate practice to be effective.
- Video based motion analysis will objectively quantify the measured parameters.

Contents lists available at ScienceDirect

International Journal of Surgery

journal homepage: www.journal-surgery.net

Original research

Surgical ergonomics. Analysis of technical skills, simulation models and assessment methods

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ANYONE CAN BE COOL BUT AWESOME TAKES PRACTICE