# ‘Flying the jet’…my perspective

Sotiris C. Papaspyros
ST7 Cardiothoracic trainee
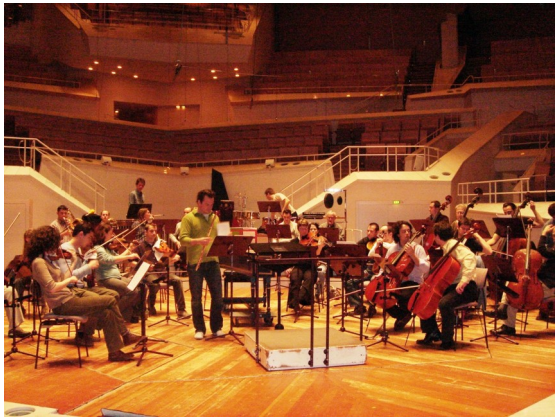


# Proper prior preparation…

… prevents poor performance

- Physical and mental fitness
- Rehearsal, warm-up, visualization



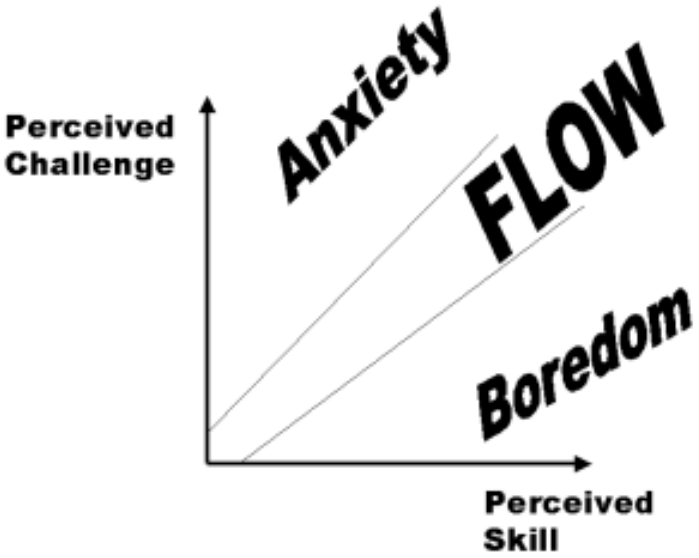




# More haste, less speed

- No hesitation, deviation, interruption or repetition  rhythm/pace  speed

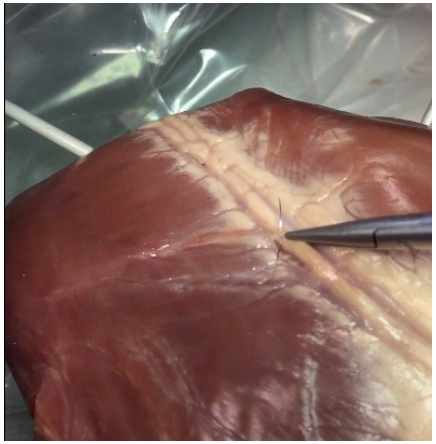




# Acquisition of skills
# Fitts and Posner's theory

| 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 |

# Cognition







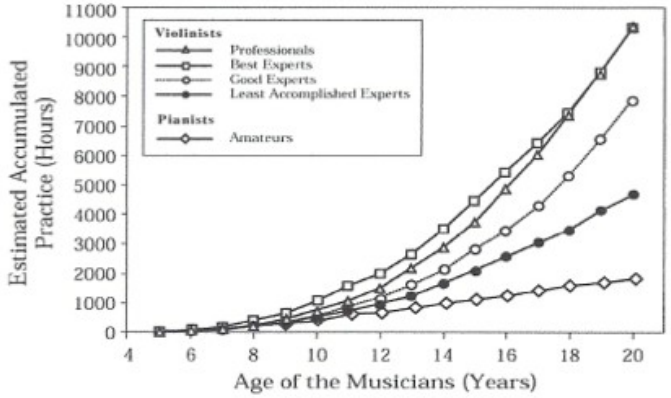
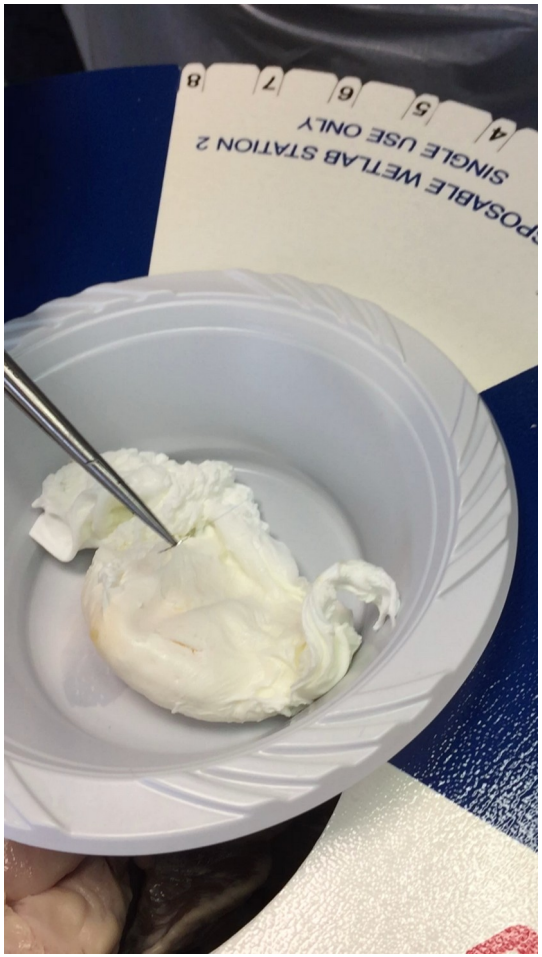


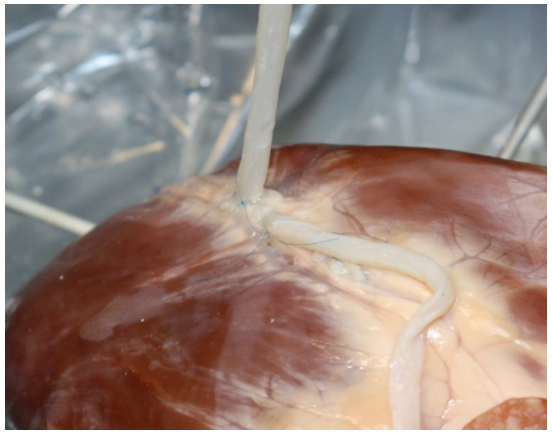

Figure 38.4. Estimated amount of time for solitary practice as a function of age for the middle-aged *professional* violinists (triangles), the *best* expert violinists (squares), the *good* expert violinists (empty circles), the *least accomplished* expert violinists (filled circles), and *amateur* 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

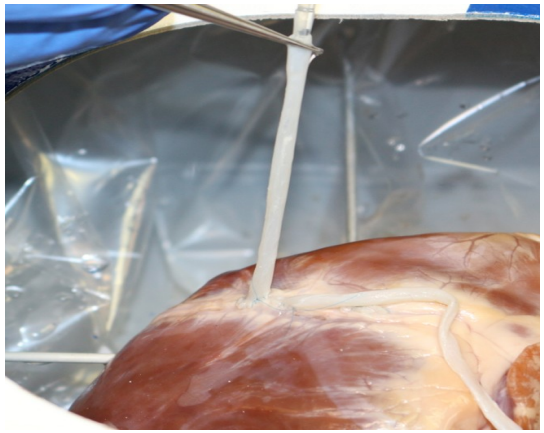
Ericsson, K. A., Krampe, R. T., & Tesch-Römer, C. (1993). The role of deliberate practice in the acquisition of expert performance. Psychological Review, 100, 363–406.

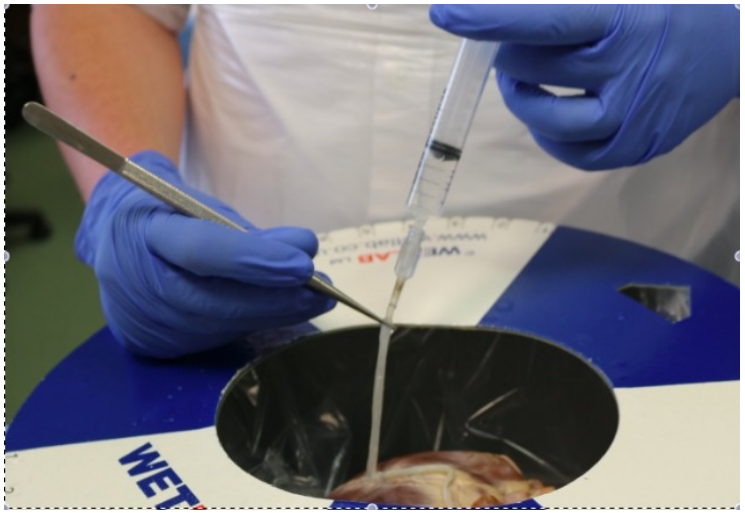
# At home practice



# Cognition

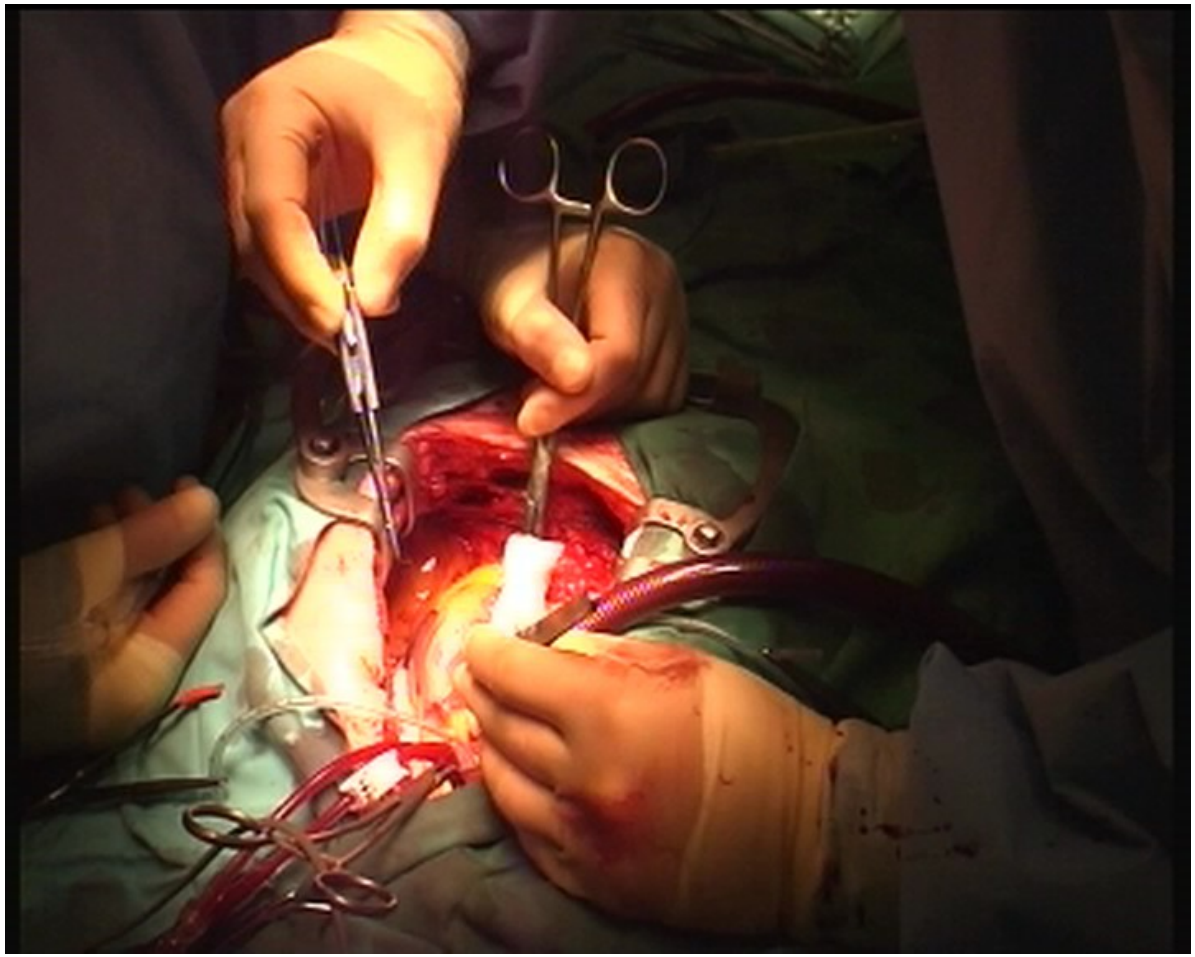




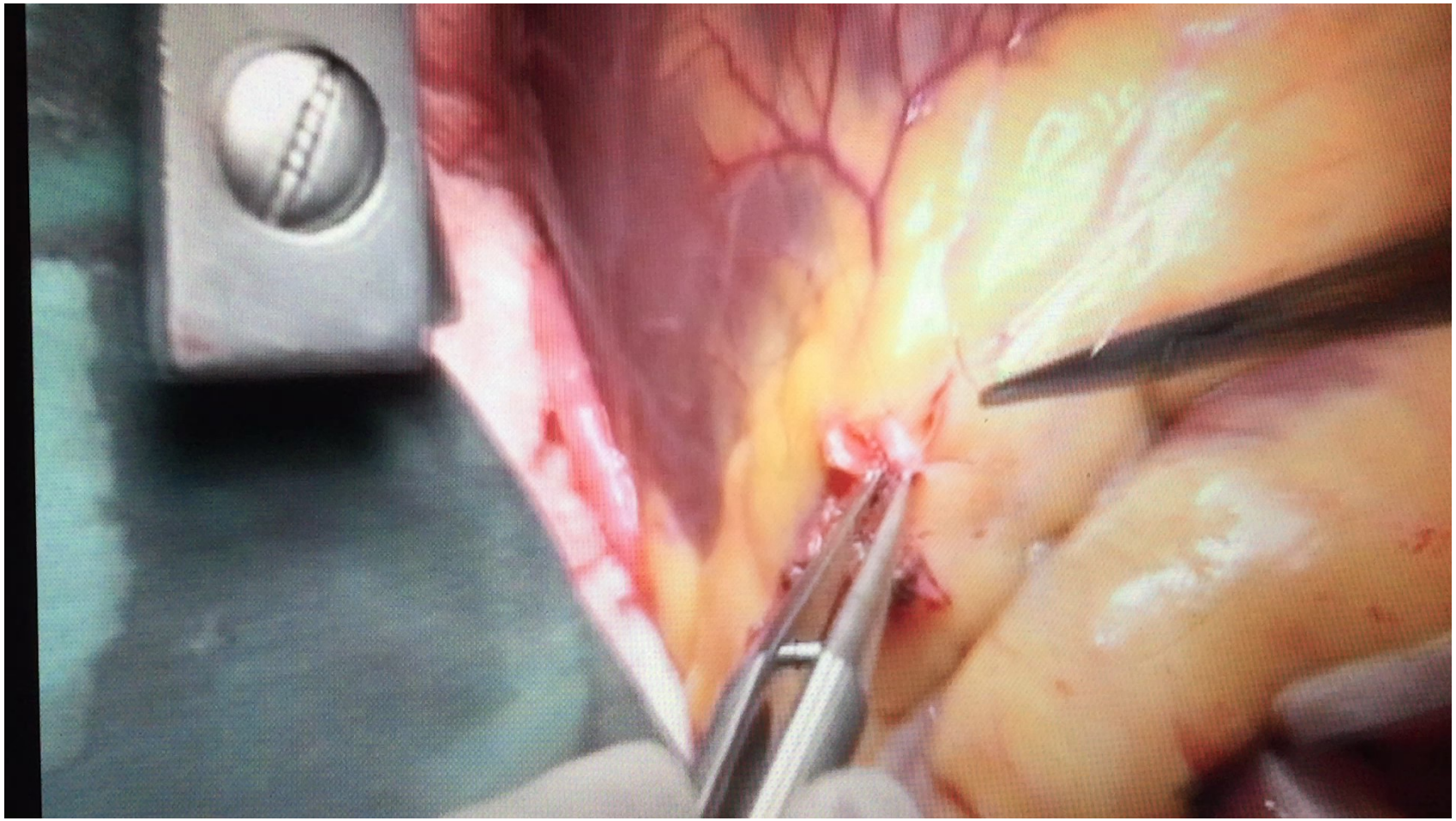



DON'T PRACTICE UNTIL
YOU GET IT RIGHT.
PRACTICE UNTIL
YOU CAN'T GET IT WRONG
BE MORE DO MORE

# Integration



# Automation

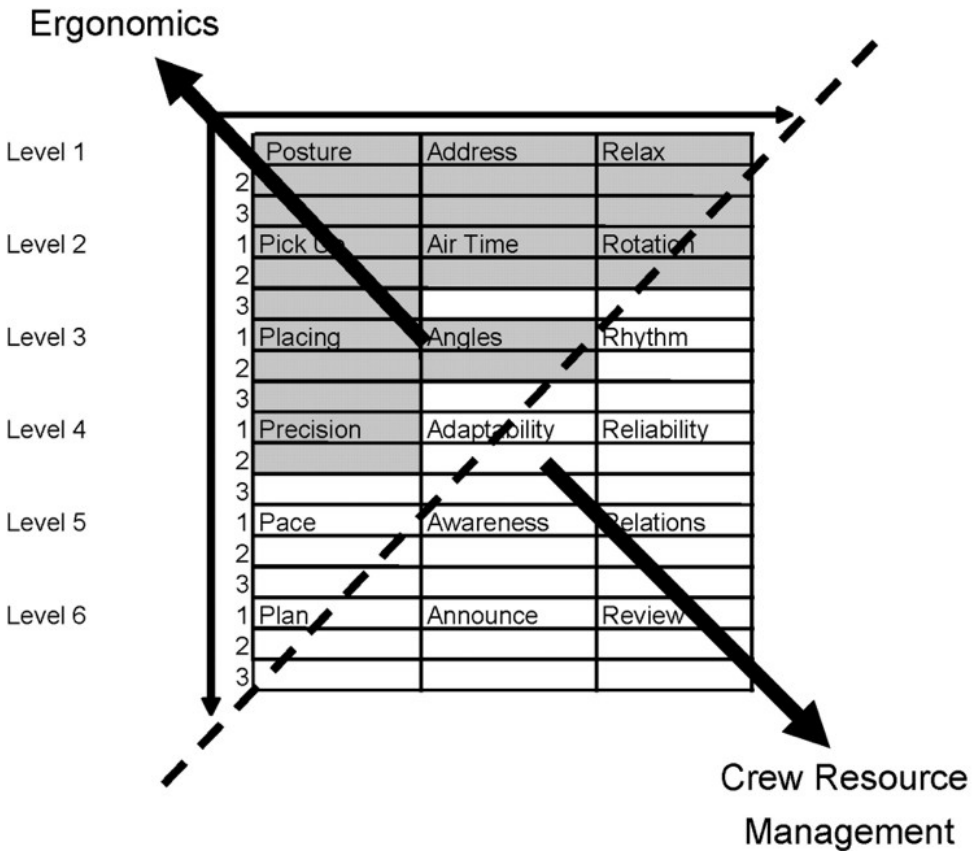


# ‘Dexterity in the left hand’

- Experts use non-dominant hand more than trainees*
- Acquire dexterity in non-dominant hand:
  - Use non-dominant hand to brush teeth and shave
  - Alternate leading hand for each exercise

*Glarner CE, Hu YY, Chen CH, Radwin RG, Zhao Q, Craven MW et al. Quantifying technical skills during open operations using video-based motion analysis. *Surgery* 2014;156:729-34.

# …from amateur golfer to professional pilot… Briefing/Debriefing



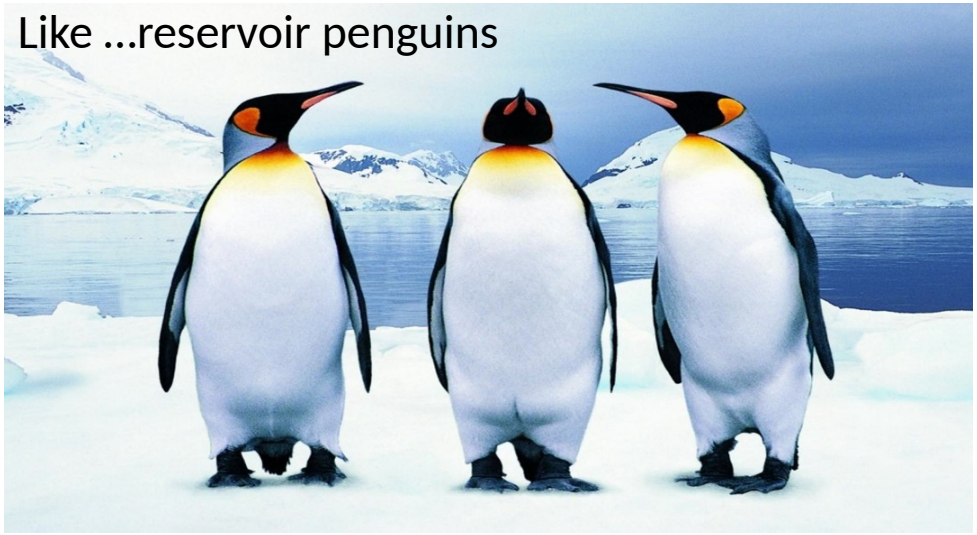


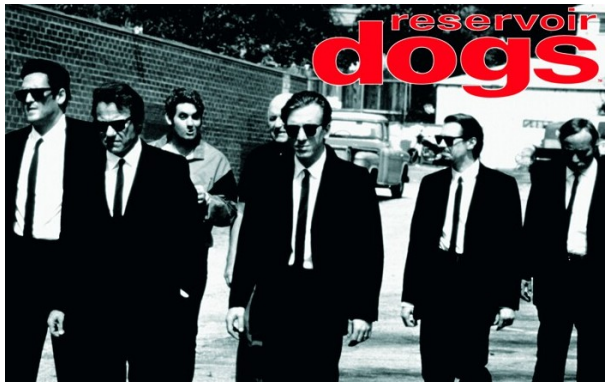


- Papaspyros SC, Javangula K, O'Regan DJ. Surgical training in the 48-h week: a novel simulation and educational tool. From amateur golfer to professional pilot. Eur J Cardiothorac Surg 2009;36:511–515.
- Papaspyros SC, Javangula KC, Adluri RK, O'Regan DJ. Briefing and debriefing in the cardiac operating room. Analysis of impact on theatre team attitude and patient safety. Interact Cardiovasc Thorac Surg. 2010;10(1):43-7.

# Surgeons should be cool

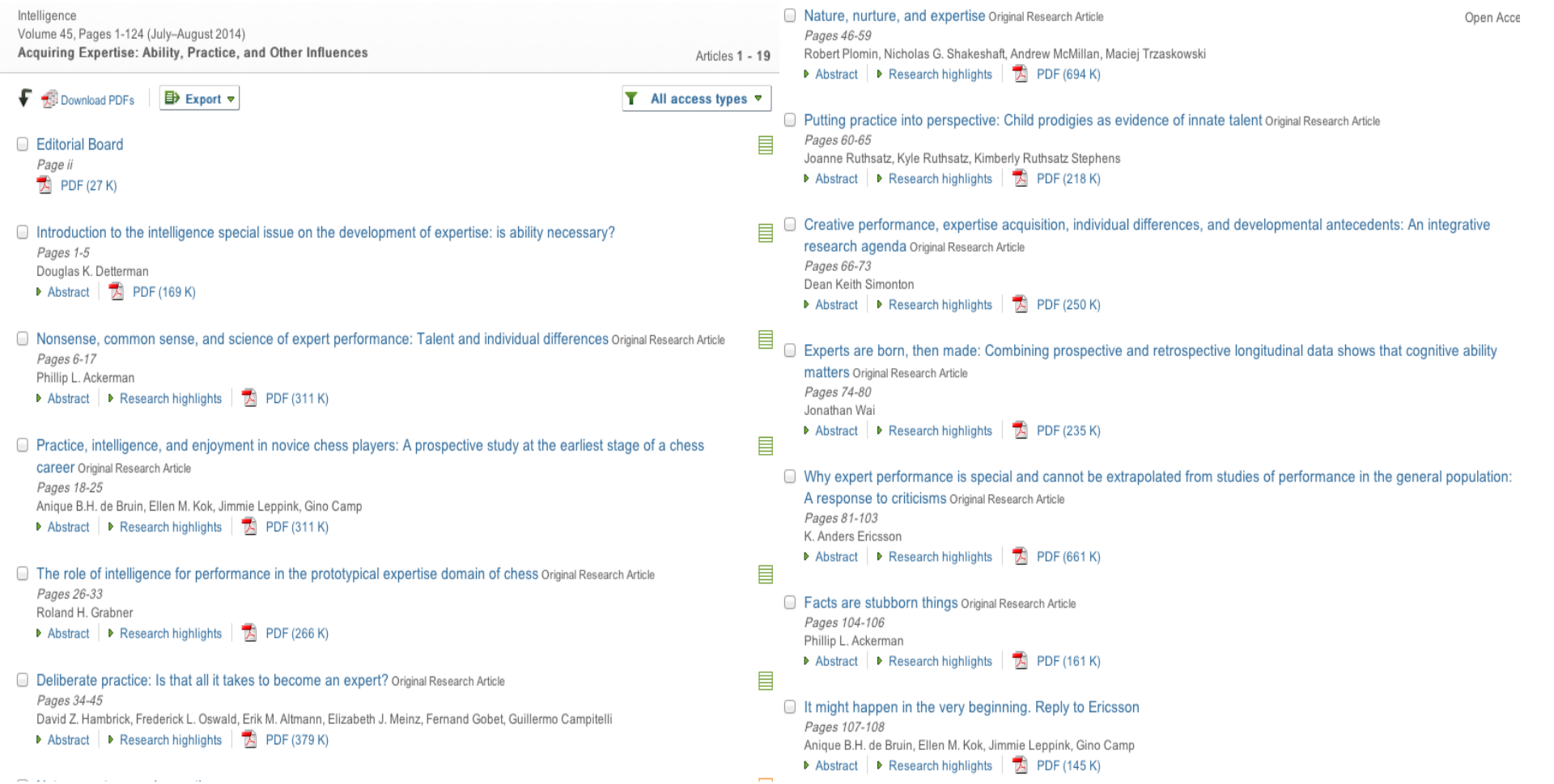
- Relaxed surgeon  pace  advancement of procedure
  - Maintains stability of theatre environment
  - Enhances team confidence
  - Improves performance




Not like extras from a Tarantino movie

# Deliberate practice vs. innate ability



Intelligence
Volume 45, Pages 1-124 (July–August 2014)
**Acquiring Expertise: Ability, Practice, and Other Influences**

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  Abstract | Research highlights | PDF (145 K)

# Deliberate practice enhances quality of laparoscopic surgical performance in a randomized controlled trial: from arrested development to expert performance

**Daniel A. Hashimoto · Pramudith Sirimanna · Ernest D. Gomez · Laura Beyer-Berjot · K. A. Ericsson · Noel N. Williams · Ara Darzi · Rajesh Aggarwal**

Received: 30 June 2014 / Accepted: 11 December 2014
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**Abstract**

*Background* This study investigated whether deliberate practice leads to an increase in surgical quality in virtual reality (VR) laparoscopic cholecystectomies (LC). Previous research has suggested that sustained DP is effective in surgical training.

*Methods* Fourteen residents were randomized into deliberate practice ($n = 7$) or control training ($n = 7$). Both groups performed ten sessions of two VR LCs. Each session, the DP group was assigned 30 min of DP activities in between LCs while the control group viewed educational videos or read journal articles. Performance was assessed on speed and dexterity; quality was rated with global (GRS) and procedure-specific (PSRS) rating scales. All participants then performed five porcine LCs.

*Results* Both groups improved over 20 VR LCs in time, dexterity, and global rating scales (all $p < 0.05$). After 20 LCs, there were no differences in speed or dexterity between groups. The DP group achieved higher quality of VR surgical performance than control for GRS (26 vs. 20, $p = 0.001$) and PSRS (18 vs. 15, $p = 0.001$). For VR cases, DP subjects plateaued at GRS = 25 after ten cases and control group at GRS = 20 after five cases. At completion of VR training, 100 % of the DP group reached target quality of performance (GRS $\geq$ 21) compared with

Preliminary results of this paper were presented at the Surgical Forum of the 2013 Annual Clinical Congress of the American College of Surgeons in Washington, DC, on October 9, 2013.

D. A. Hashimoto · P. Sirimanna · L. Beyer-Berjot · A. Darzi

Psychological Science
2014, Vol. 25(8) 1608–1618
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DOI: 10.1177/0956797614535810
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# Deliberate Practice and Performance in Music, Games, Sports, Education, and Professions: A Meta-Analysis

**Brooke N. Macnamara[1], David Z. Hambrick[2], and Frederick L. Oswald[3]**
[1]Princeton University; [2]Michigan State University; and [3]Rice University

**Abstract**
More than 20 years ago, researchers proposed that individual differences in performance in such domains as music, sports, and games largely reflect individual differences in amount of *deliberate practice*, which was defined as engagement in structured activities created specifically to improve performance in a domain. This view is a frequent topic of popular-science writing—but is it supported by empirical evidence? To answer this question, we conducted a meta-analysis covering all major domains in which deliberate practice has been investigated. We found that deliberate practice explained 26% of the variance in performance for games, 21% for music, 18% for sports, 4% for education, and less than 1% for professions. We conclude that deliberate practice is important, but not as important as has been argued.

**Keywords**
deliberate practice, talent development, meta-analysis, human performance, skill acquisition, expertise, open data

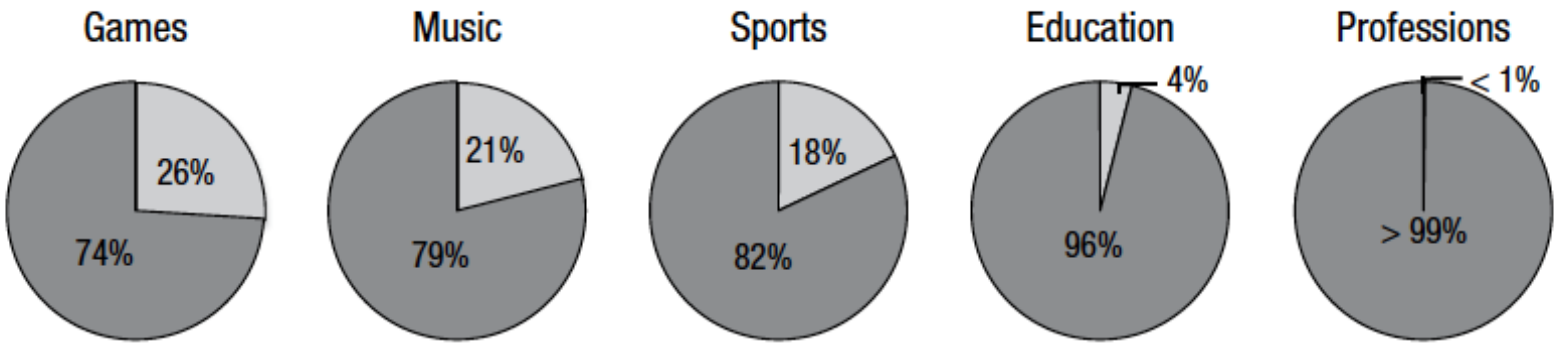



**Fig. 3.** Percentage of variance in performance explained (light gray) and not explained (dark gray) by deliberate practice within each domain studied. Percentage of variance explained is equal to $r^2 \times 100$.

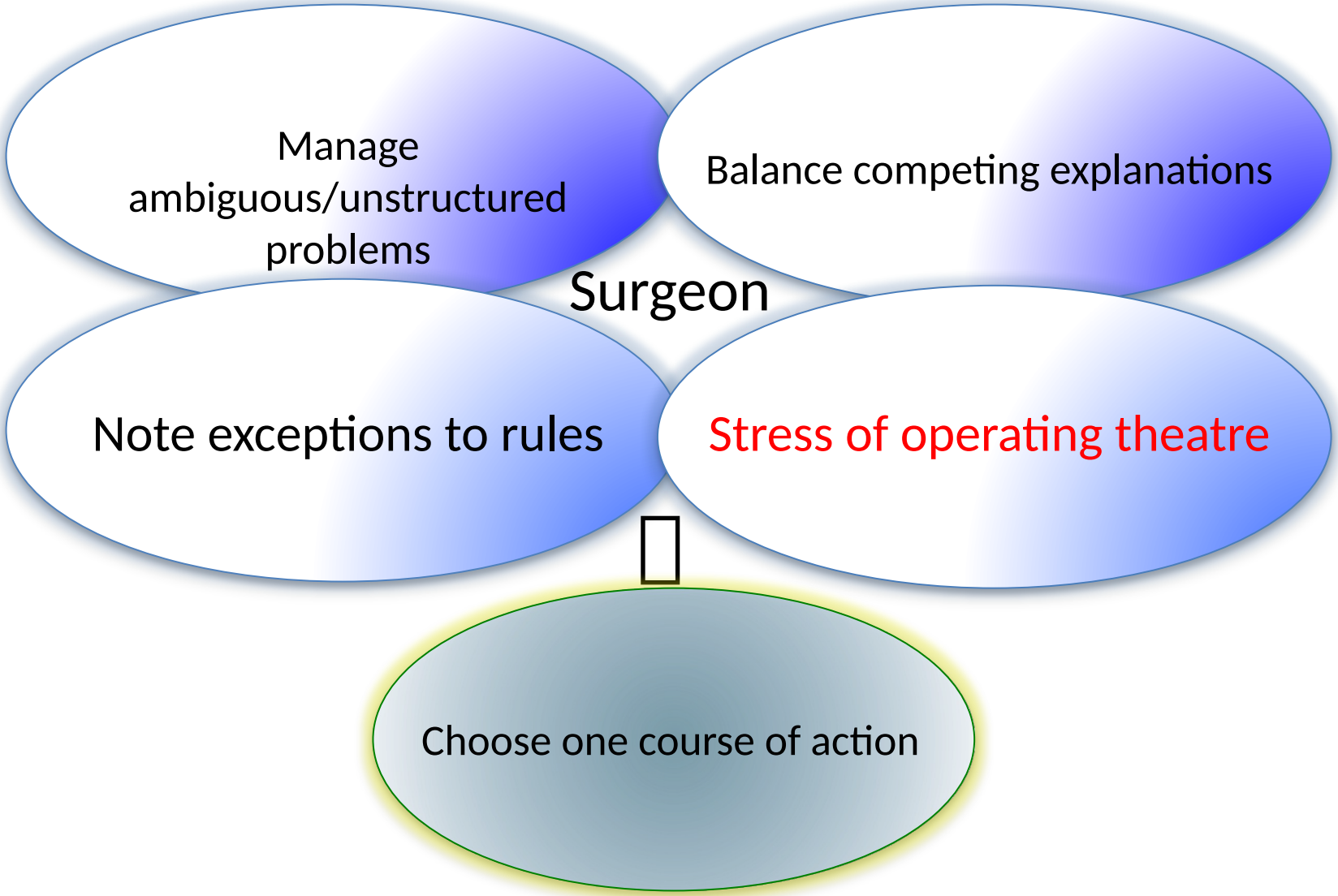
# Acquisition and Maintenance of Medical Expertise: A Perspective From the Expert-Performance Approach With Deliberate Practice

K. Anders Ericsson, PhD

## Abstract

As a part of a special collection in this issue of *Academic Medicine*, which is focused on mastery learning in medical education, this Perspective describes how the expert-performance approach with deliberate practice is consistent with many characteristics of mastery learning. Importantly, this Perspective also explains how the expert-performance approach provides a very different perspective on the acquisition of skill. Whereas traditional education with mastery learning focuses on having students attain an adequate level of performance that is based on goals set by the existing curricula, the expert-performance approach takes an empirical approach and first identifies the final goal of training—namely, reproducibly superior objective performance (superior patient outcomes) for individuals in particular medical specialties. Analyzing this superior complex performance reveals three types of mental representations that permit expert performers to plan, execute, and monitor their own performance. By reviewing research on medical performance and education, the author describes evidence for these representations and their development within the expert-performance framework. He uses the research to generate suggestions for improved training of medical students and professionals. Two strategies—designing learning environments with libraries of cases and creating opportunities for individualized teacher-guided training—should enable motivated individuals to acquire a full set of refined mental representations. Providing the right resources to support the expert-performance approach will allow such individuals to become self-regulated learners—that is, members of the medical community who have the tools to improve their own and their team members' performances throughout their entire professional careers.

# …one more thing



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Original research

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

Sotiris C. Papaspyros [a,*], Ashok Kar [b], David O'Regan [c]



ANYONE CAN BE COOL BUT AWESOME TAKES PRACTICE