Surgical ergonomics

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Background

- Ensure quality/appropriateness of procedures
- Reduce adverse events and risk
- Improve outcomes
- Reduce cost

‘Surgical experience is a posy of other men’s flowers’

Lord Moynihan

Proper prior preparation…

… prevents poor performance

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







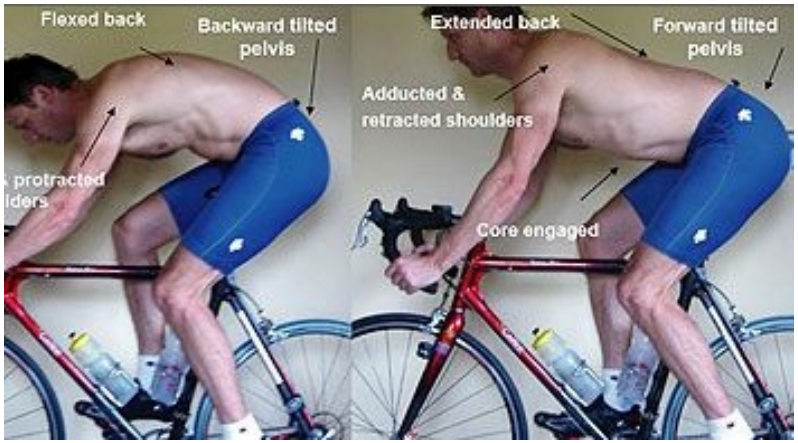
Technical skills

- Technique + practice = motor memory ➔ Harmony of thought process and movement
- No hesitation, deviation, interruption or repetition ➔ rhythm ➔ speed



Posture

- Enables relaxed upper limb movement
- Height and tilt of operating table

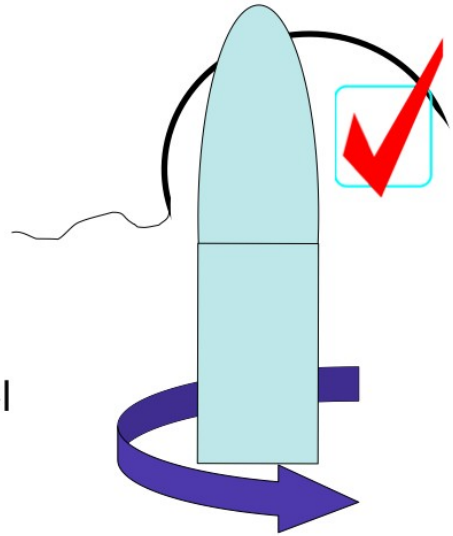




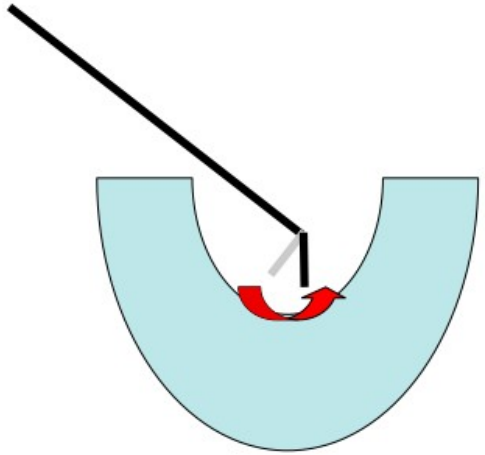
Needle handling

The Castro needle-holder

- ‘Sweet spot’
- Roll the barrel

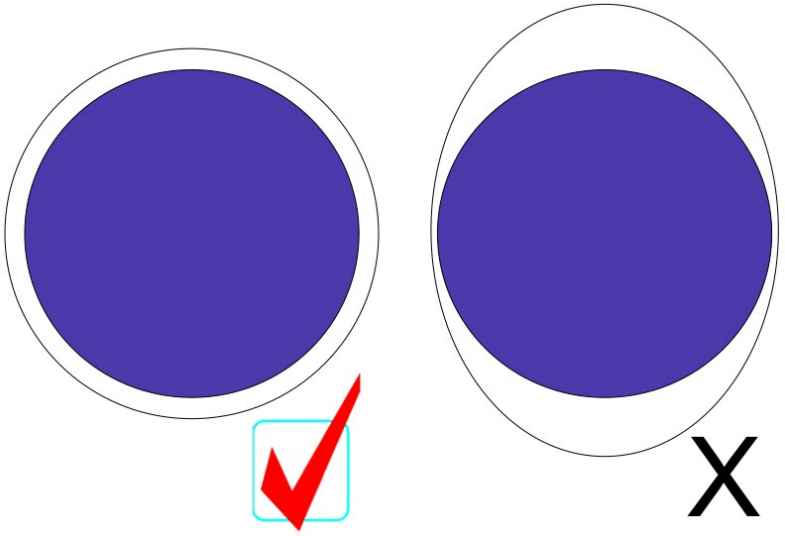


Angle into the chest



The perfect angle





Dry vs. ‘sweating’/bleeding anastomosis

Non-dominant hand

- Experts use non-dominant hand more than trainees*
- Acquire dexterity in non-dominant hand:
  - Use non-dominant hand to brush teeth or shave
  - Reverse fork and knife use

*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.

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 - low fidelity models

- Shorter workweek for trainees
- Increased complexity of cases
- Emphasis on operating room efficiency,
- Medical error mitigation

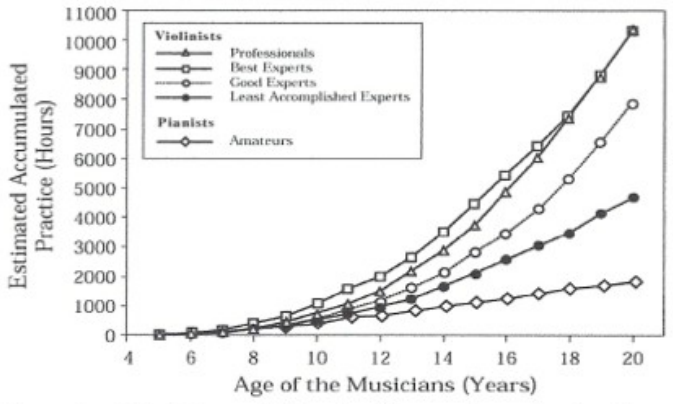
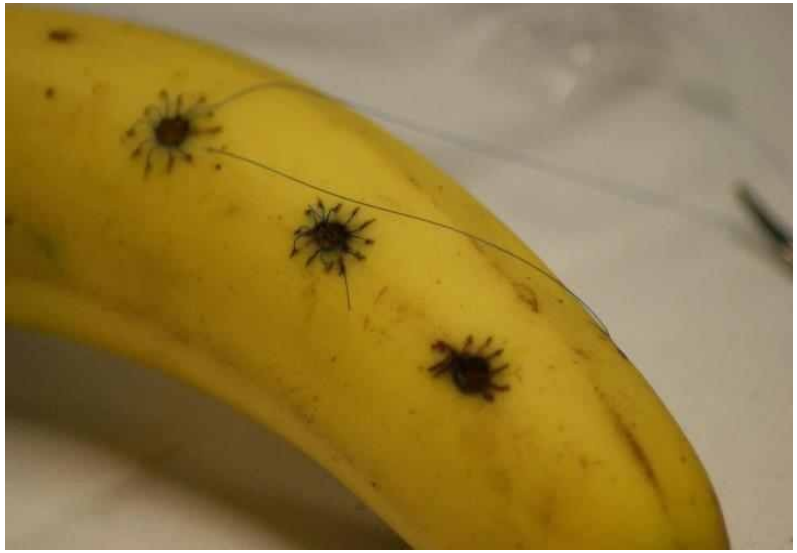


Figure 38.4. Estimated amount of time for solitary practice as a function of age for the middle-aged *professional* violinists (triangles), the *best* expert violinists (squares), the *good* expert violinists (empty circles), the *least accomplished* expert violinists (filled circles), and *amateur*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



Integration



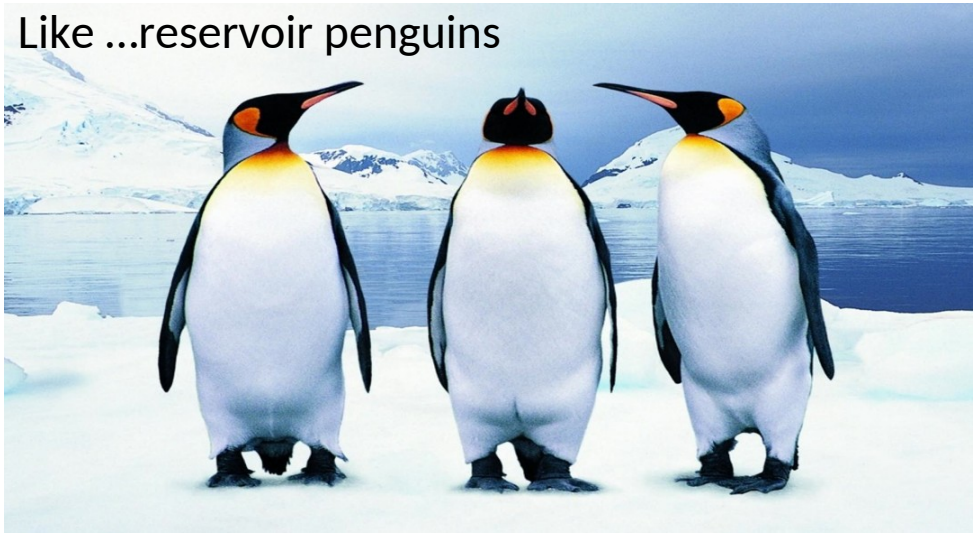
Automation

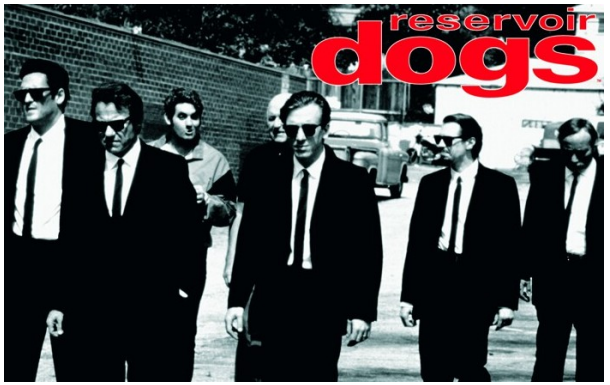


Surgeons should be cool

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

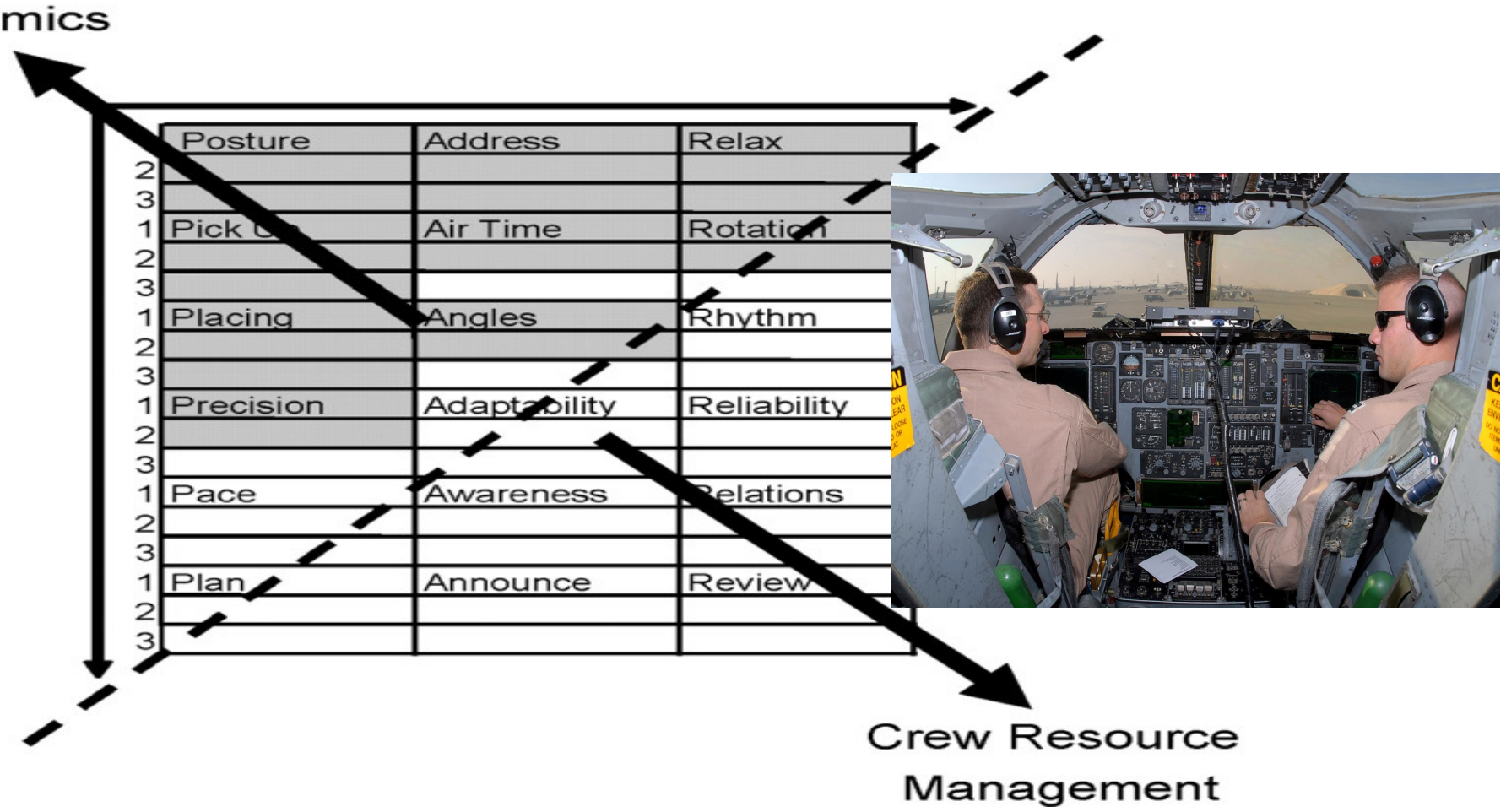
Like …reservoir penguins





Not like extras from a Tarantino movie

CRM – Briefing - Debriefing

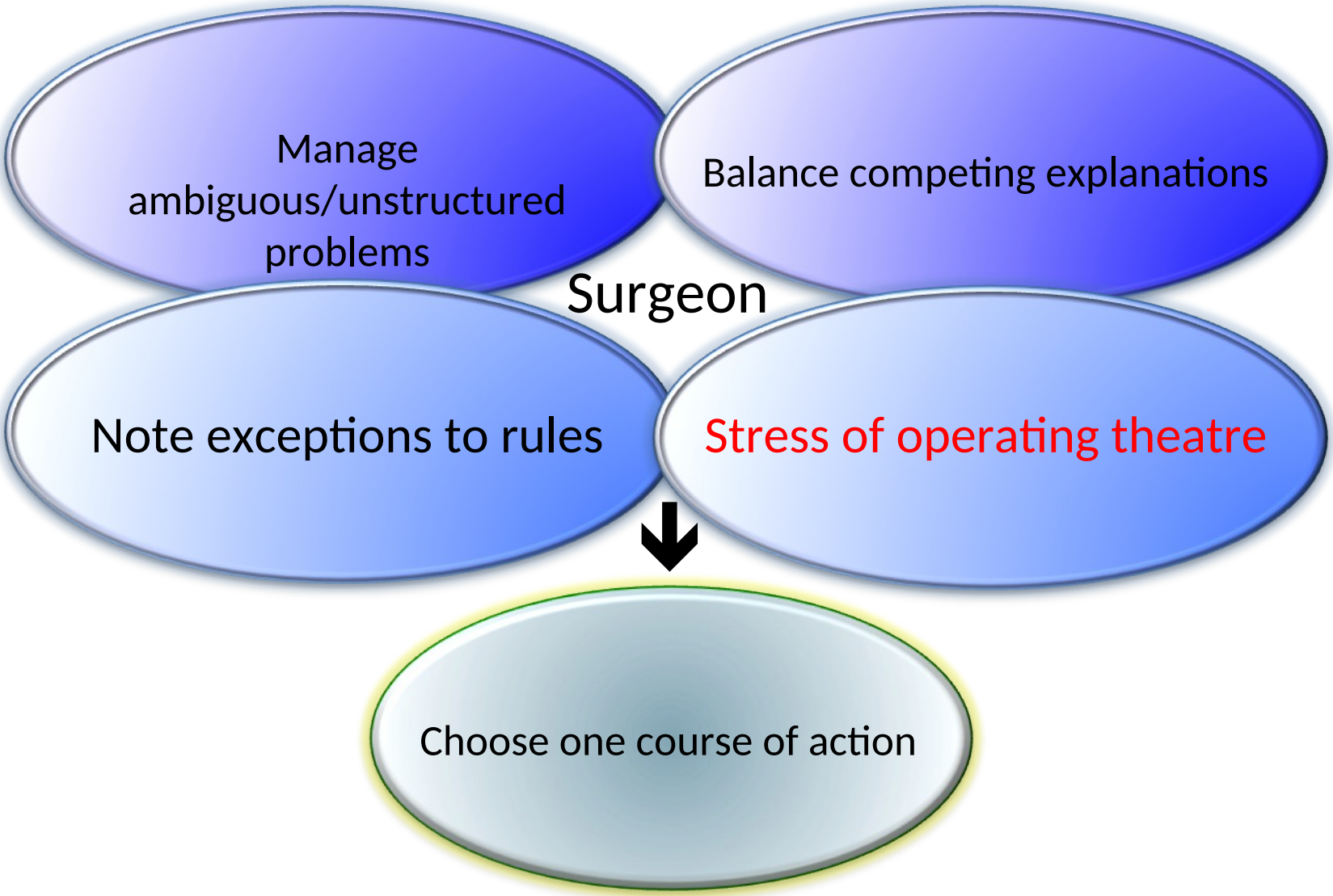


Deliberate practice vs. innate ability

- Deliberate practice: The engagement in structured activities created specifically to improve a skill. Requires feedback
- General intelligence and personality traits



…one more thing



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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