

Le chirurgien et le musicien

Pascal Vouhé

40^{ème} Séminaire de Cardiologie Pédiatrique

Paris 21-22 mars 2019

une vieille histoire

- . Leopold Auenbrugger (1722-1809)
- . Alexander Borodin (1833-1887)
- . Theodore Billroth (1829-1894)
- . **René-Théophile Laënnec** (1782-1826)

- . Alain Carpentier
- . Yves Lecompte
- . (Philipp Bonhoeffer)

-

des faits démontrés

1. la musique au bloc opératoire est bénéfique pour le patient

- . diminue conséquences du stress
- . diminue douleur et anxiété
- . diminue besoins en anesthésiques et antalgiques

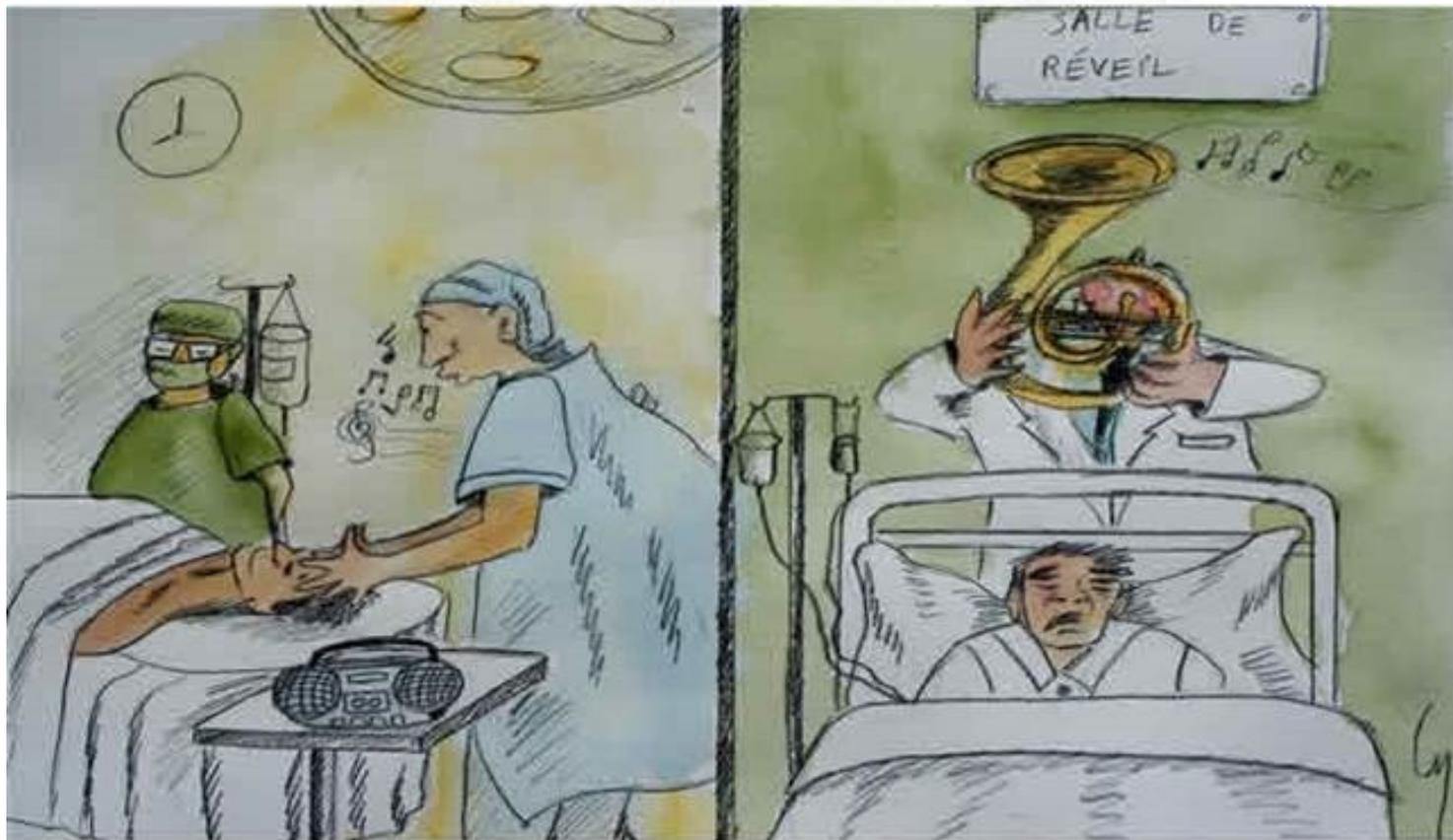


Lepage C et al. Anesth Analg 2001;93:912

Nilsson U et al. Acta Anaesthesiol Scand 2203;47:278

Wang SM et al. Anesth Analg 2002;94:1489

des faits démontrés



Mozart

Wagner

des faits démontrés

2. la musique au bloc est bénéfique pour le chirurgien

- . diminue réaction cardiovasculaire au stress
- . améliore rapidité et précision manuelles
- . augmente capacité de concentration
- . augmente efficacité intellectuelle

Allen K et al. JAMA 1994;272:882

Miskovic D et al. Surg Endosc 2008;22:2416

Conrad C et al. Surg Endosc 2010;24:1347

des faits démontrés

rapidité geste laparoscopique (simulateur)



Miskovic D et al. Randomized controlled trial investigating the effect of music on the virtual reality laparoscopic learning performance of novice surgeons. Surg Endosc 2008;22:2416

le chirurgien et le musicien



A Musician's Brain 

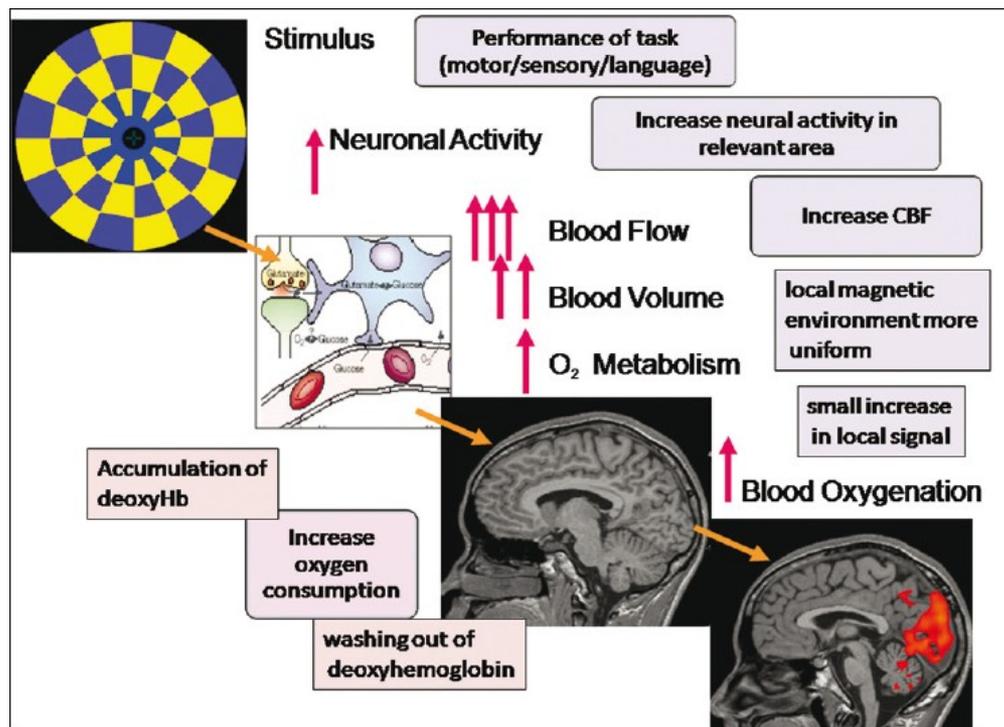
15% larger corpus callosums
(fibers that connect the left and right brain hemispheres)

auditory cortex with 130% more gray matter
(where cell bodies, dendrites, and axioms exist)

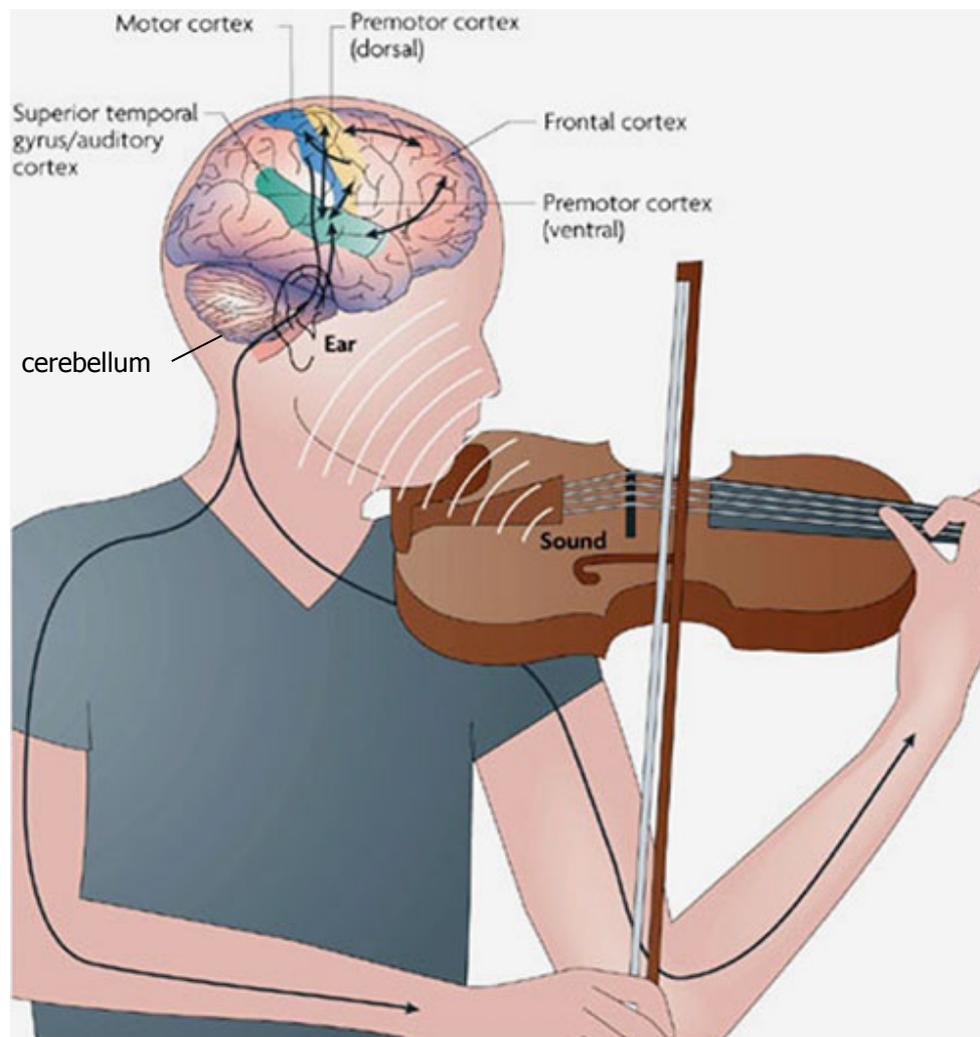
Larger cerebellums
(responsible for motor skills)

Source: Head Squeeze

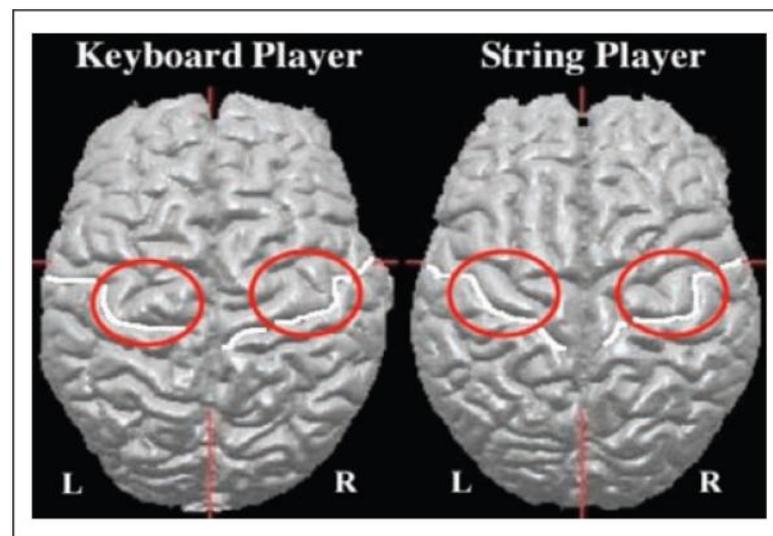
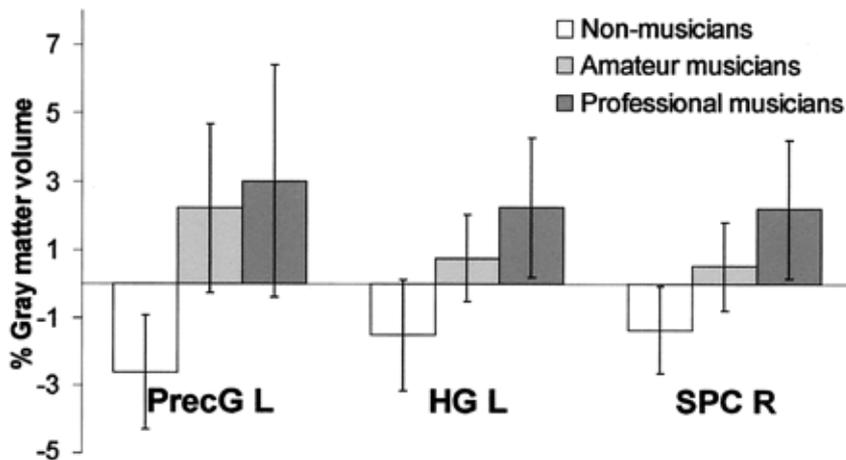
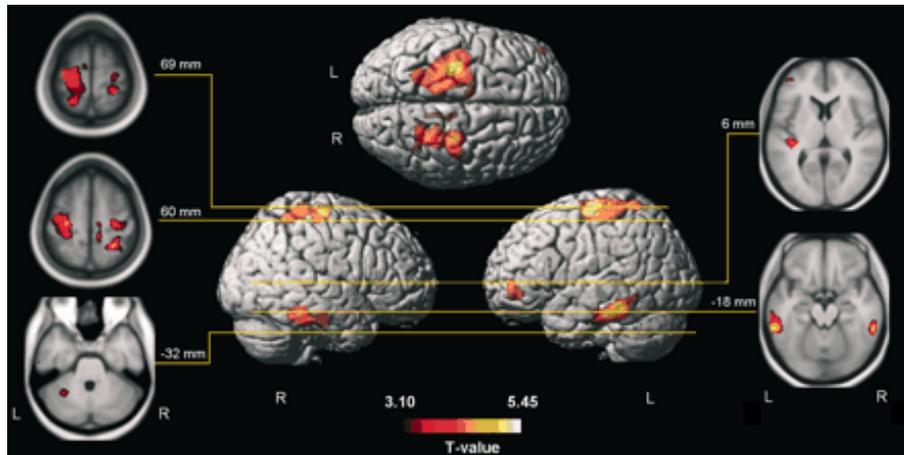
les musiciens ont un cerveau spécifique et plastique



les musiciens ont un cerveau spécifique et plastique

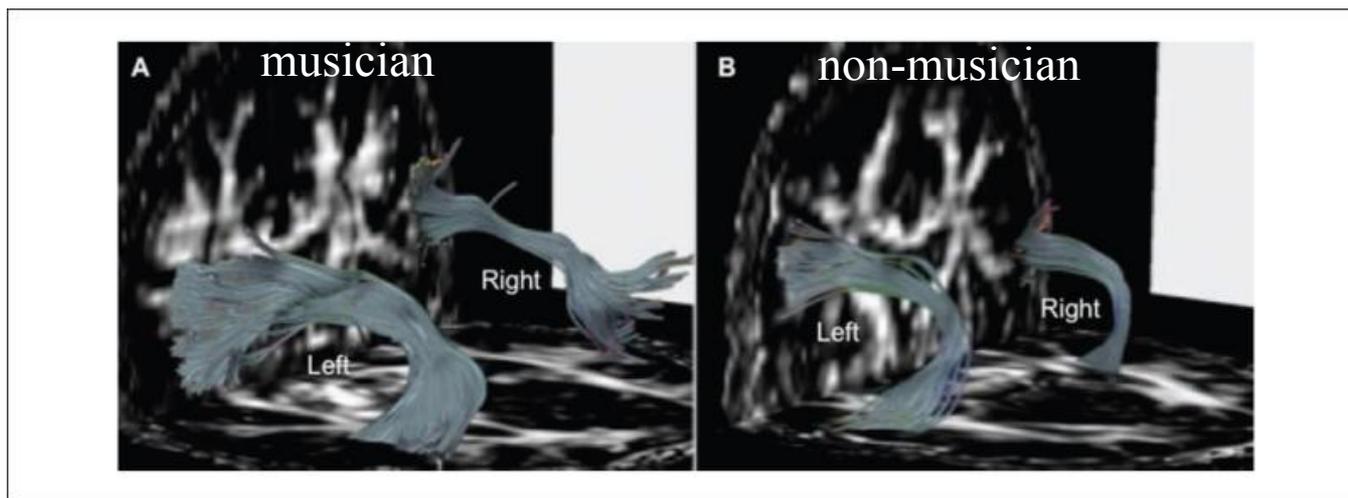
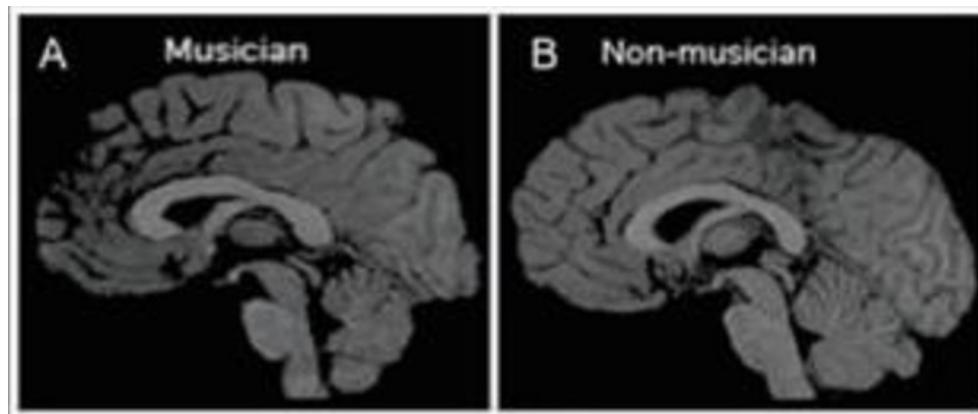


les musiciens ont un cerveau spécifique et plastique



Gaser C, Schlaug G Brain structures differ between musicians and non-musicians. *J Neurosci* 2003;23:9240

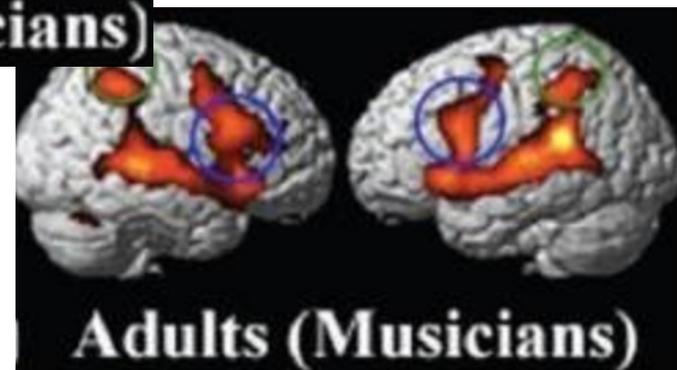
les musiciens ont un cerveau spécifique et plastique



*Wan CY, Schlaug G
Neuroscientist 2010;16:566*

Music making as a tool for promoting brain plasticity across the life span.

les musiciens ont un cerveau spécifique et plastique



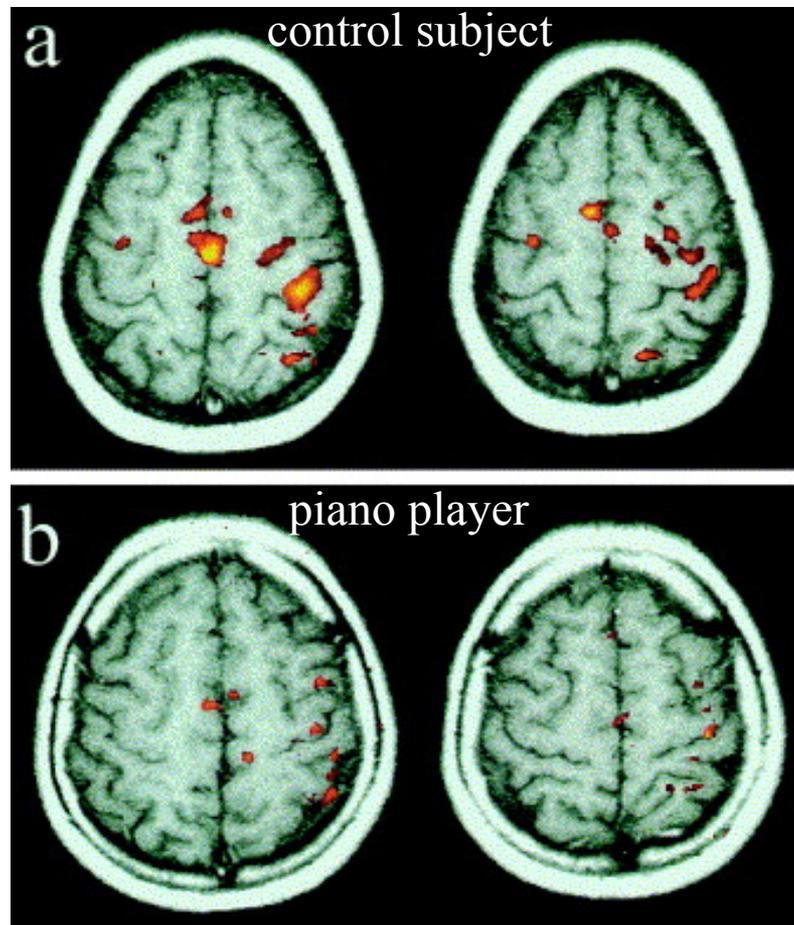
même stimulation rythmique

*Wan CY, Schlaug G
Neuroscientist 2010;16:566*

Music making as a tool for promoting brain plasticity across the life span.

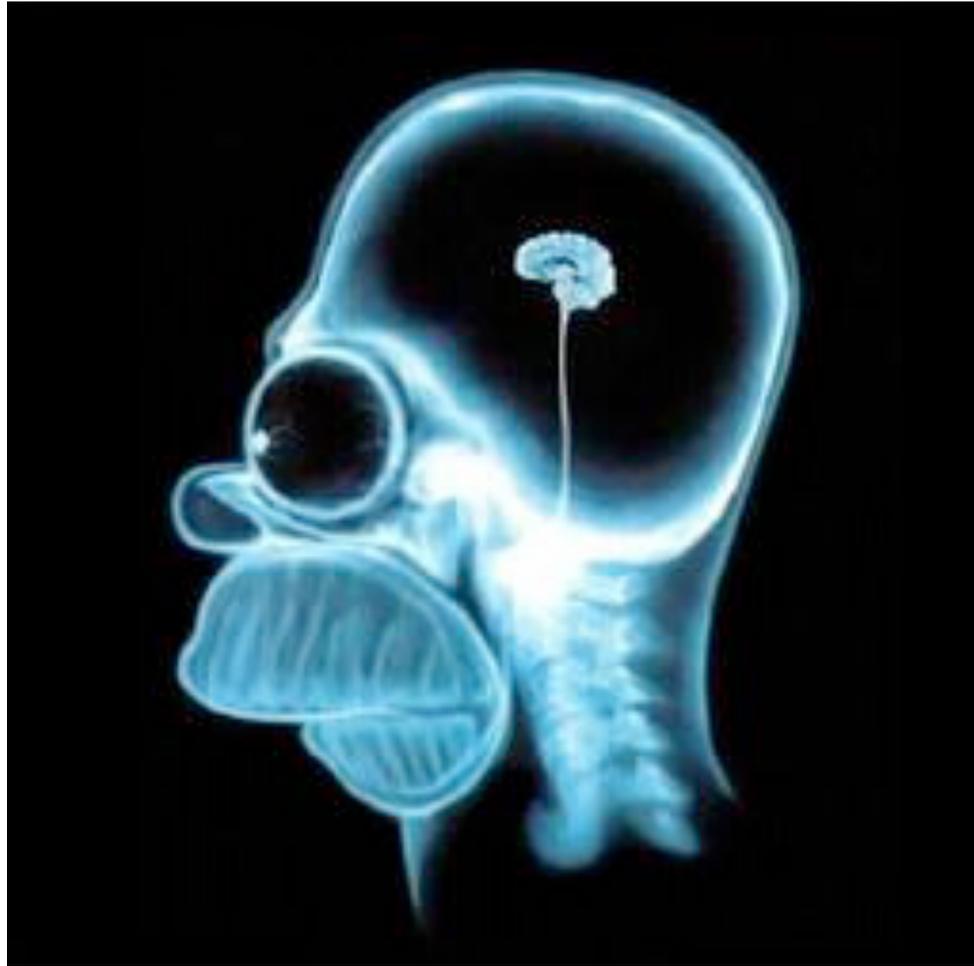
les musiciens ont un cerveau spécifique et plastique

efficacité neuronale

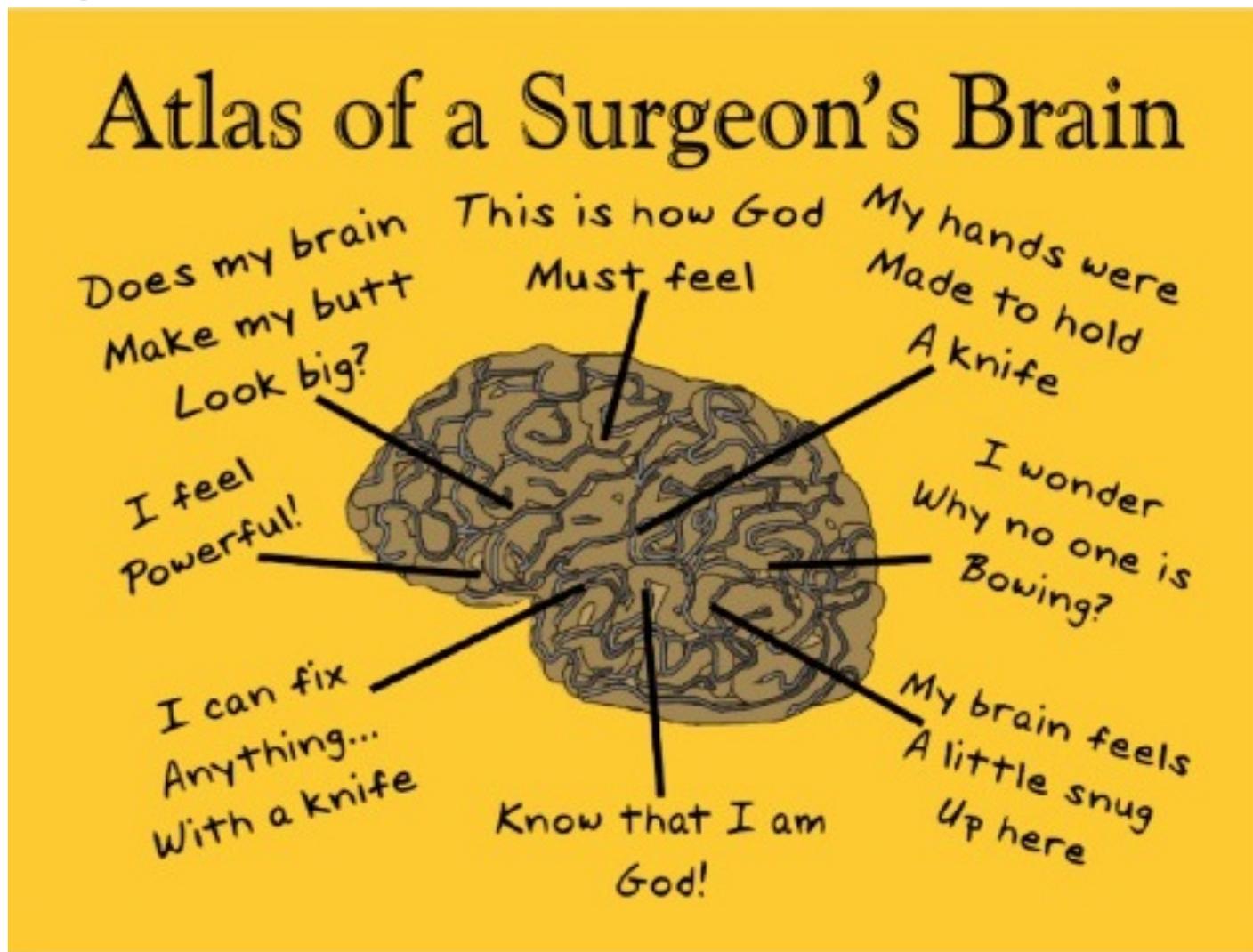


Krings T et al. Cortical activation patterns during complex motor tasks in piano players and control subjects. A functional magnetic resonance imaging study. Neurosci Lett 2000;278:189

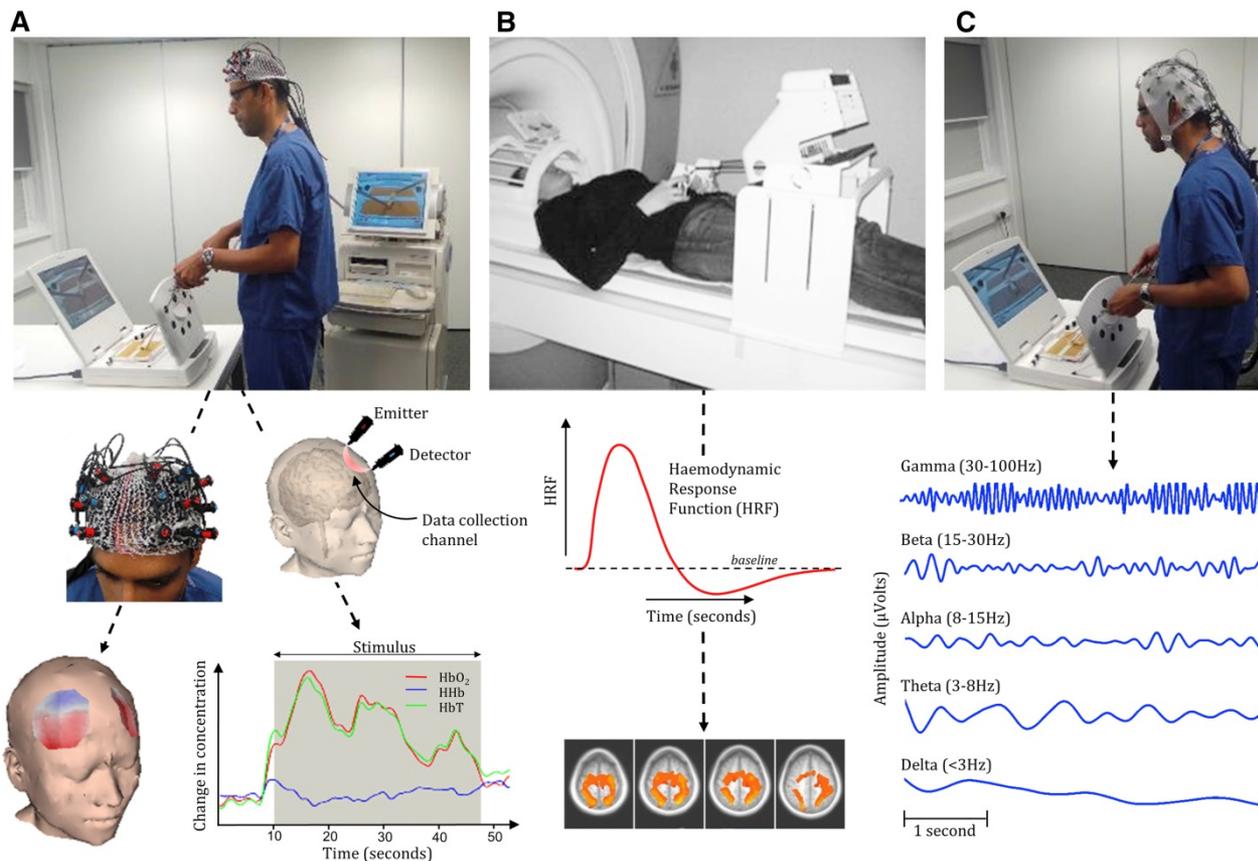
les chirurgiens ont un cerveau ?



les chirurgiens ont un cerveau ...

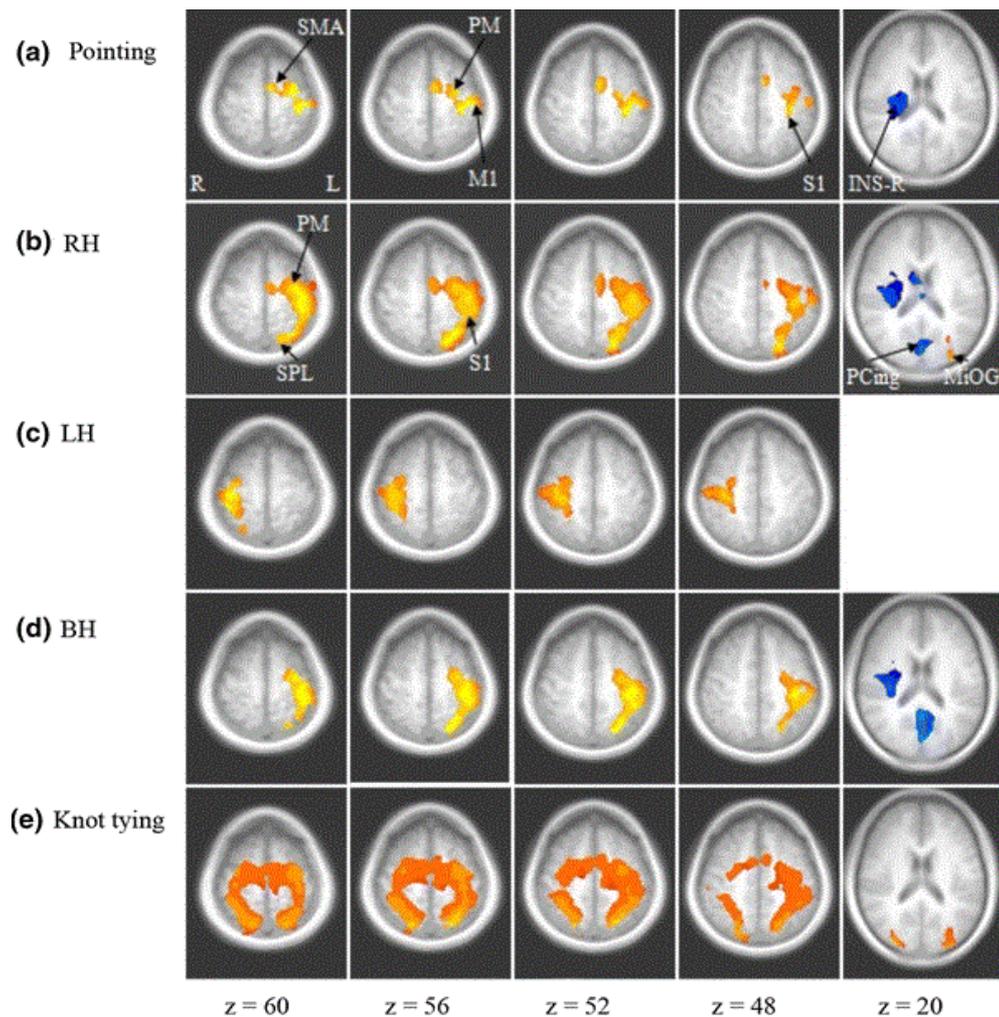


les musiciens ont un cerveau spécifique et plastique



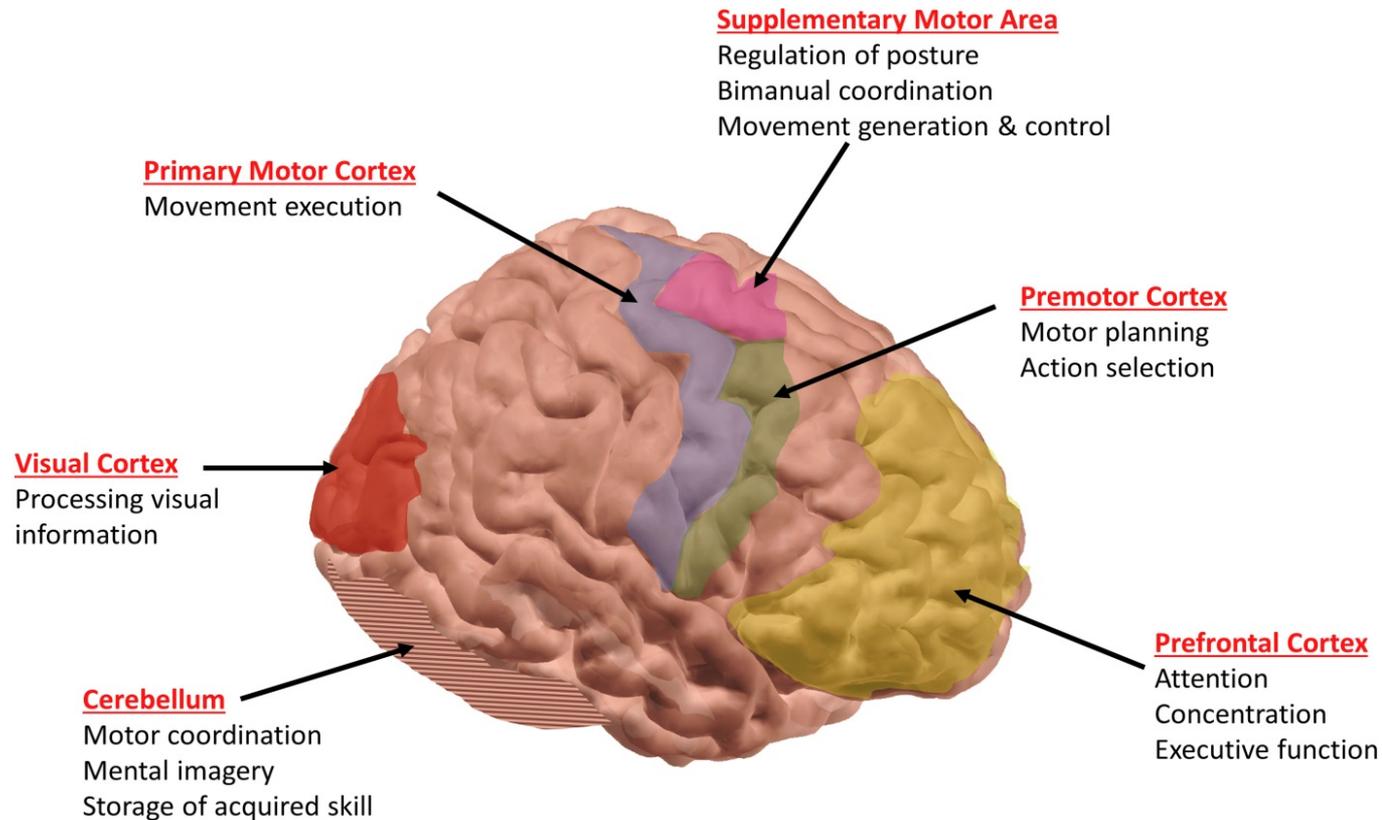
Modi HN et al. A decade of imaging surgeons' brain function : terminology, techniques, and clinical translation. Surgery 2017;162:1121

les chirurgiens ont un cerveau spécifique et plastique



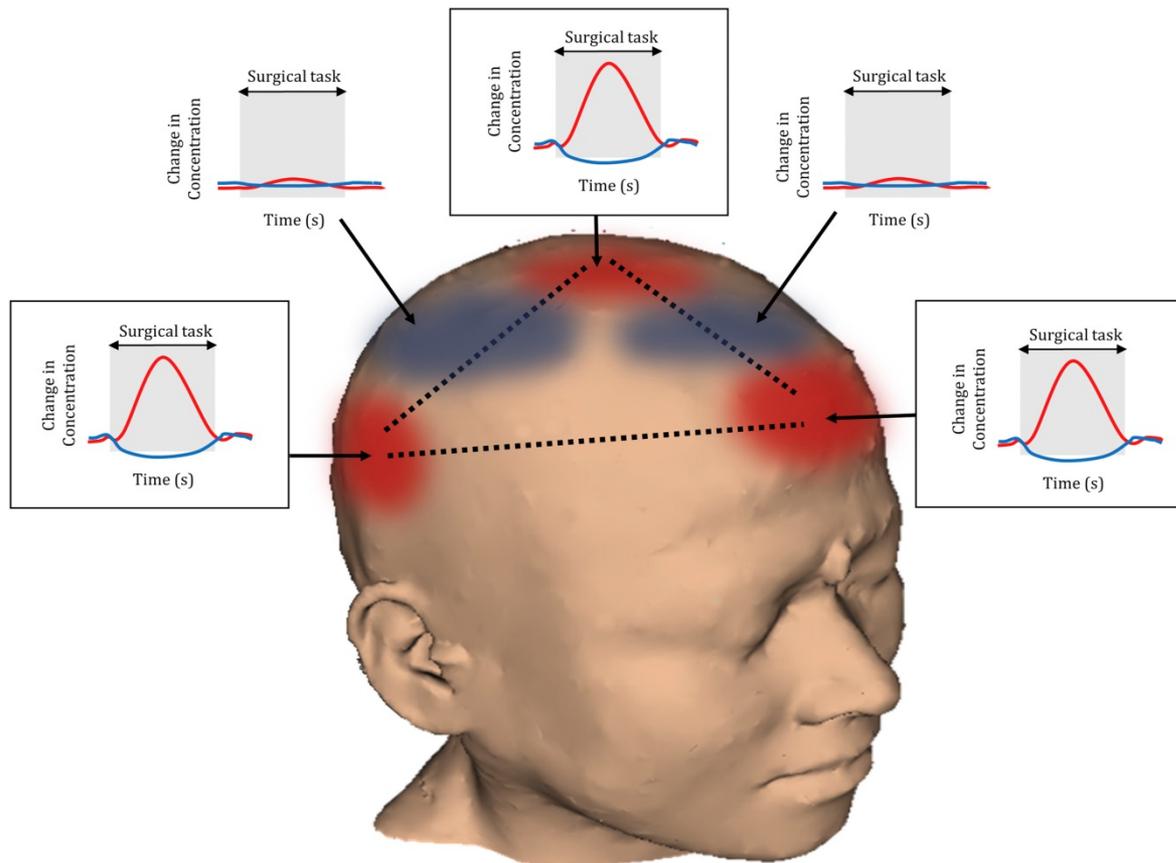
Bahrami P et al. Neuroanatomical correlates of laparoscopic surgery training. Surg Endosc 2014;28:2189

les musiciens ont un cerveau spécifique et plastique



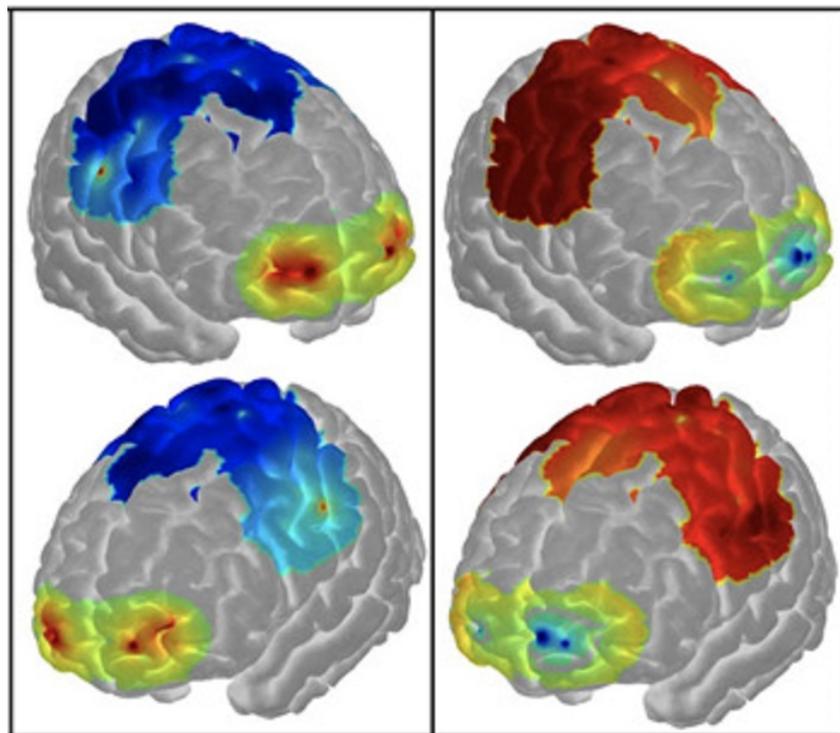
Modi HN et al. A decade of imaging surgeons' brain function : a systematic review of applications for technical and nontechnical skills assessment. Surgery 2017;162:1130

les musiciens ont un cerveau spécifique et plastique



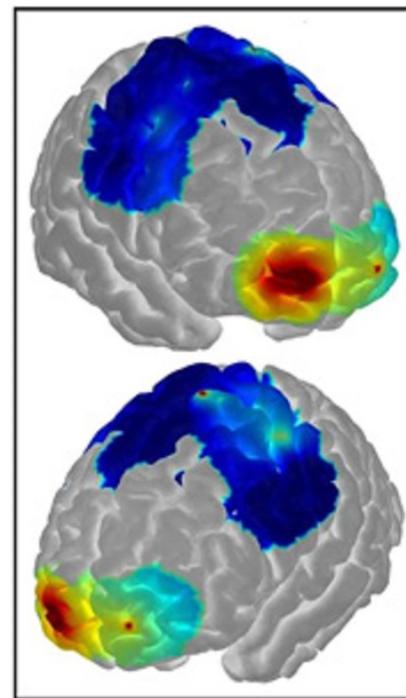
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les musiciens ont un cerveau spécifique et plastique

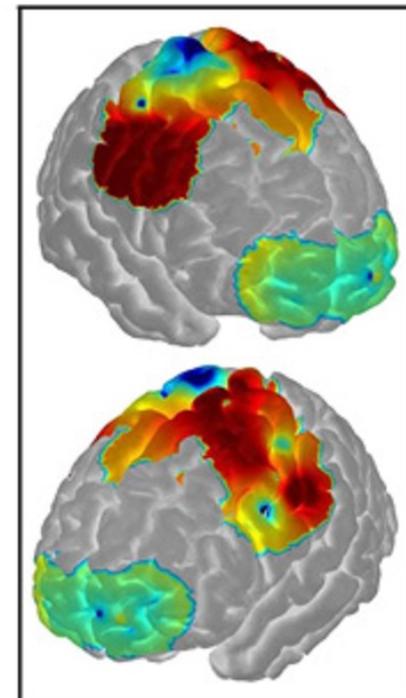


Novice surgeons

Expert surgeons



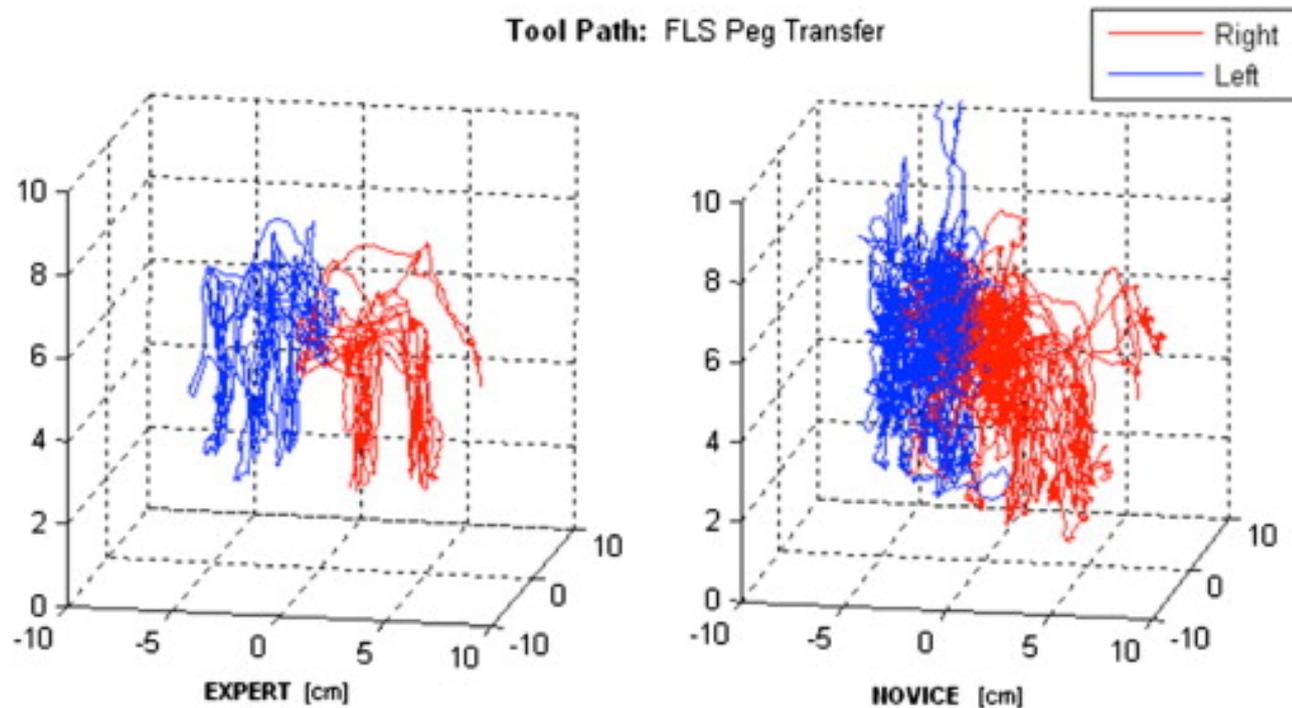
Unskilled trainees



Skilled trainees

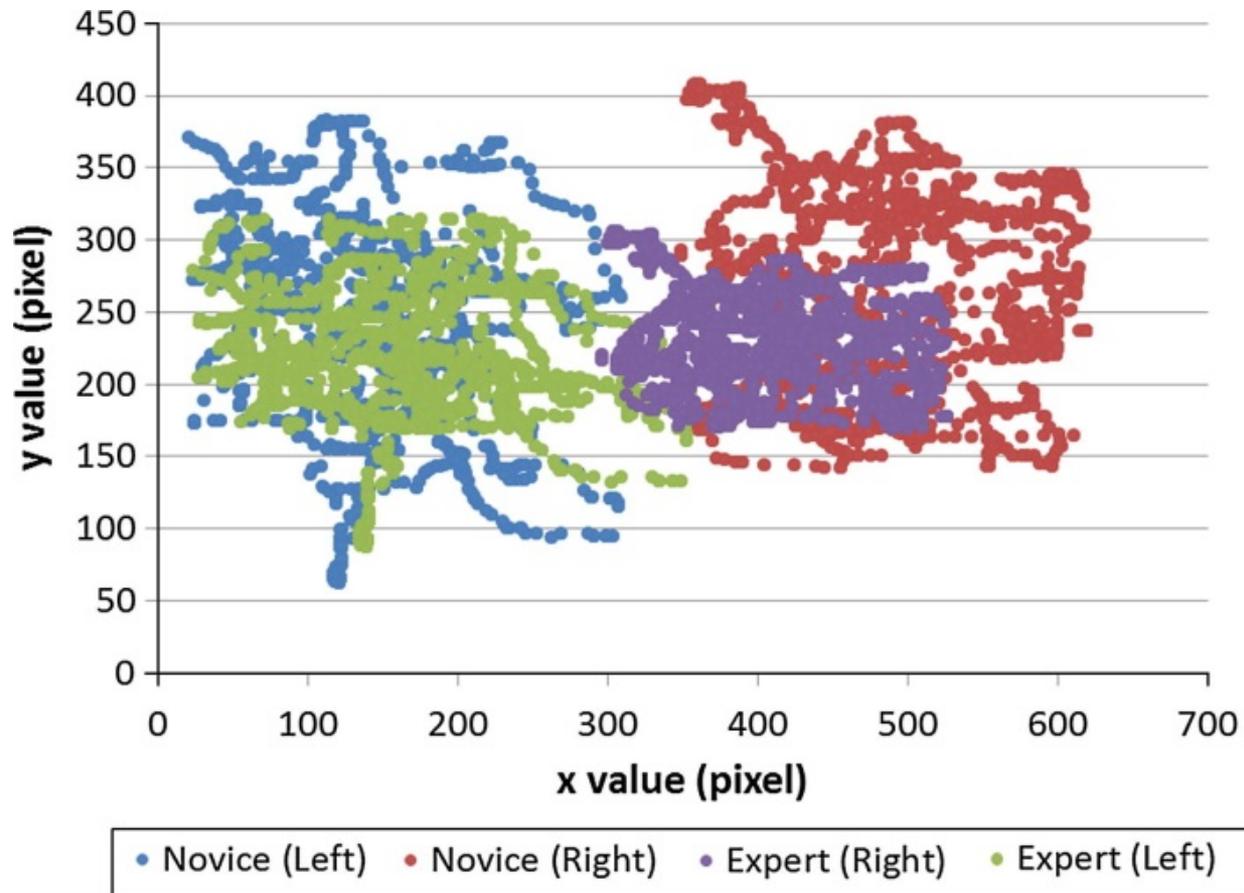
Nemani A HN et al. Assessing bimanual motor skills with optical neuroimaging. Sci Adv 2018;4:eaat3807

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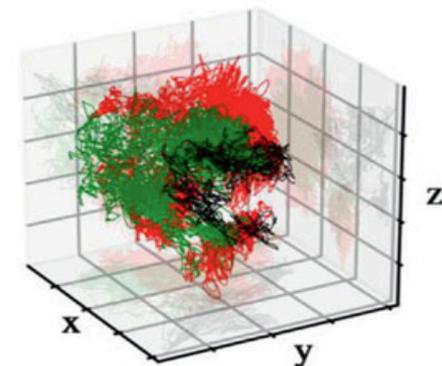
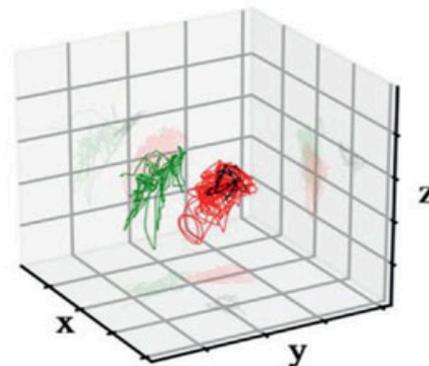
Kowalewski TM et al. Beyond task time: automated measurement augments fundamentals of laparoscopic skills methodology. J Surg Research 2014;192:329

les chirurgiens ont un cerveau spécifique et plastique

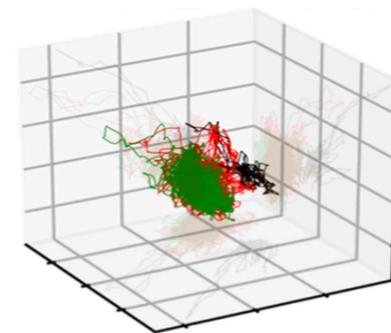
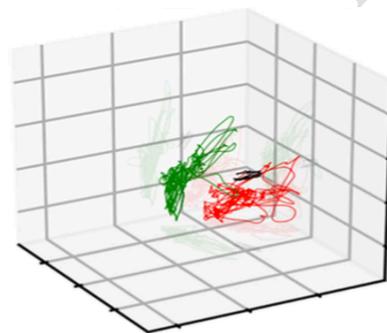


*Islam G et al. Affordable, web-based surgical skill training and evaluation tool.
J Biomed Informat 2016;59:102*

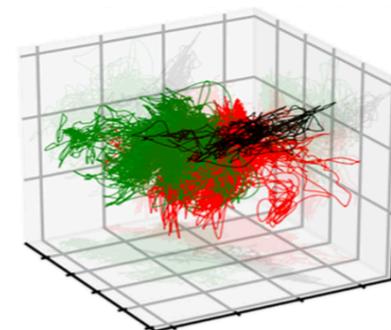
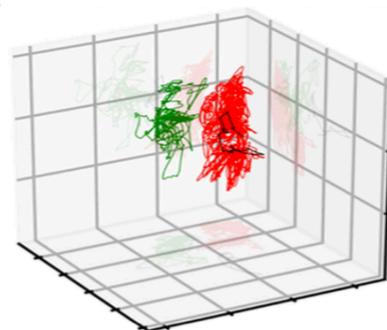
bladder mobilization



anterior vesico-urethral
anastomosis

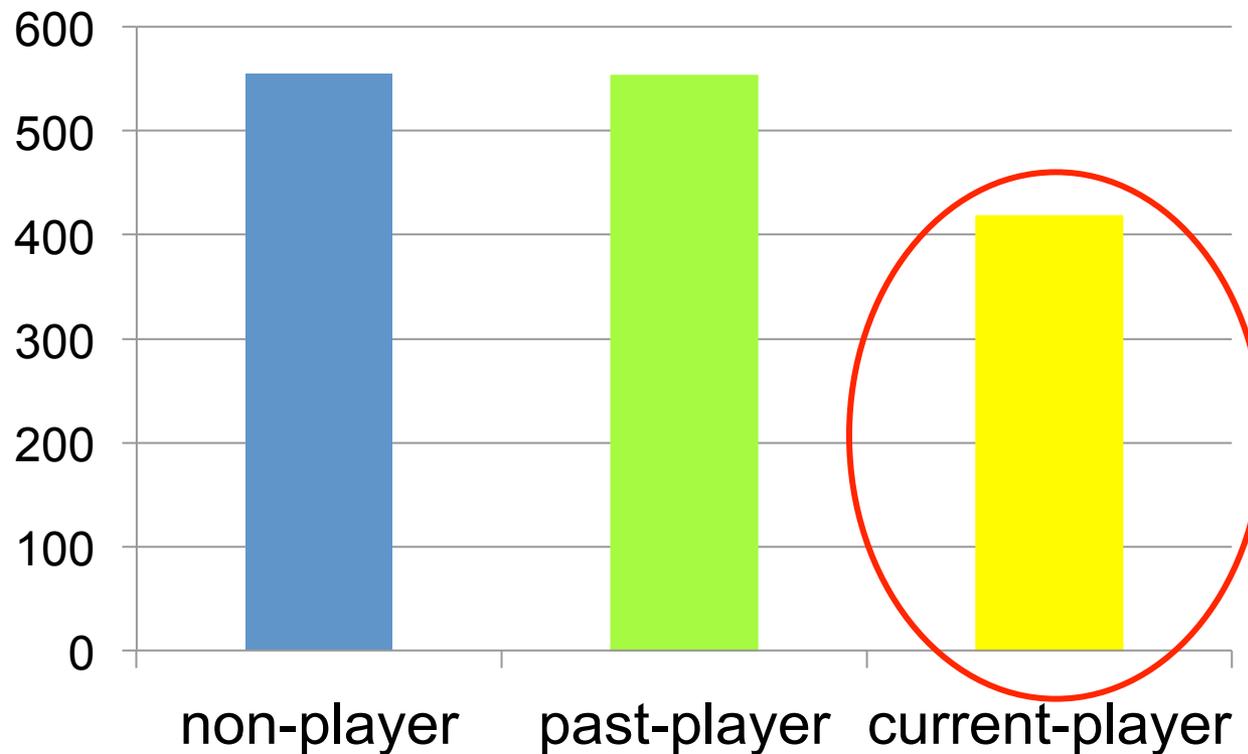


right pelvic
lymphadenectomy



Hung AJ et al. Development and validation of objective performance metrics for robot-assisted radical prostatectomy: a pilot study. J Urol 2018;199:296

les chirurgiens ont un cerveau spécifique et plastique



Boyd T et al. Music experience influences laparoscopic skills performance. JSLs 2008;12:292

- . dextérité et coordination bimanuelle
- . visualisation spatiale (rotation mentale)
- . coordination main – œil/oreille
- . intégration information sensorielle

- . concentration
- . anticipation
- . respect protocole
- . capacité décisionnelle
- . improvisation

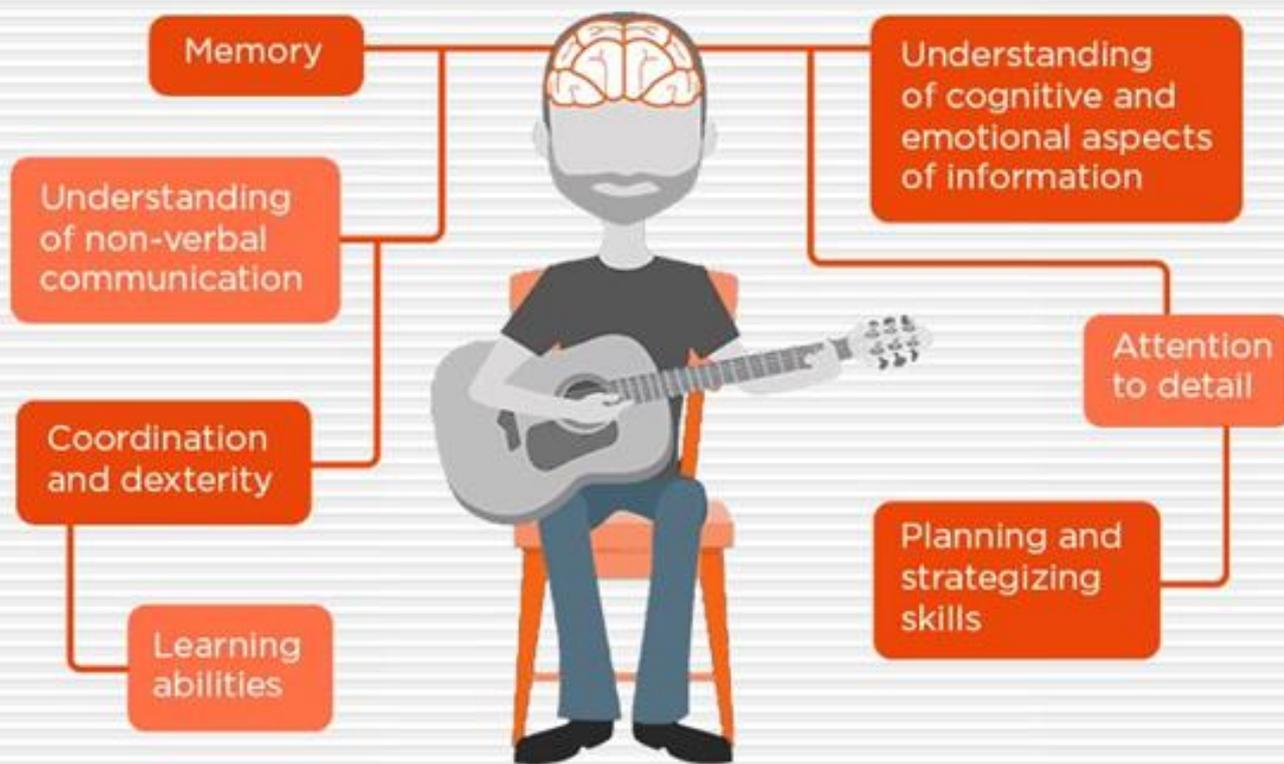
«virtuosité»
instrumentiste
opérateur

«musicalité»
musicien

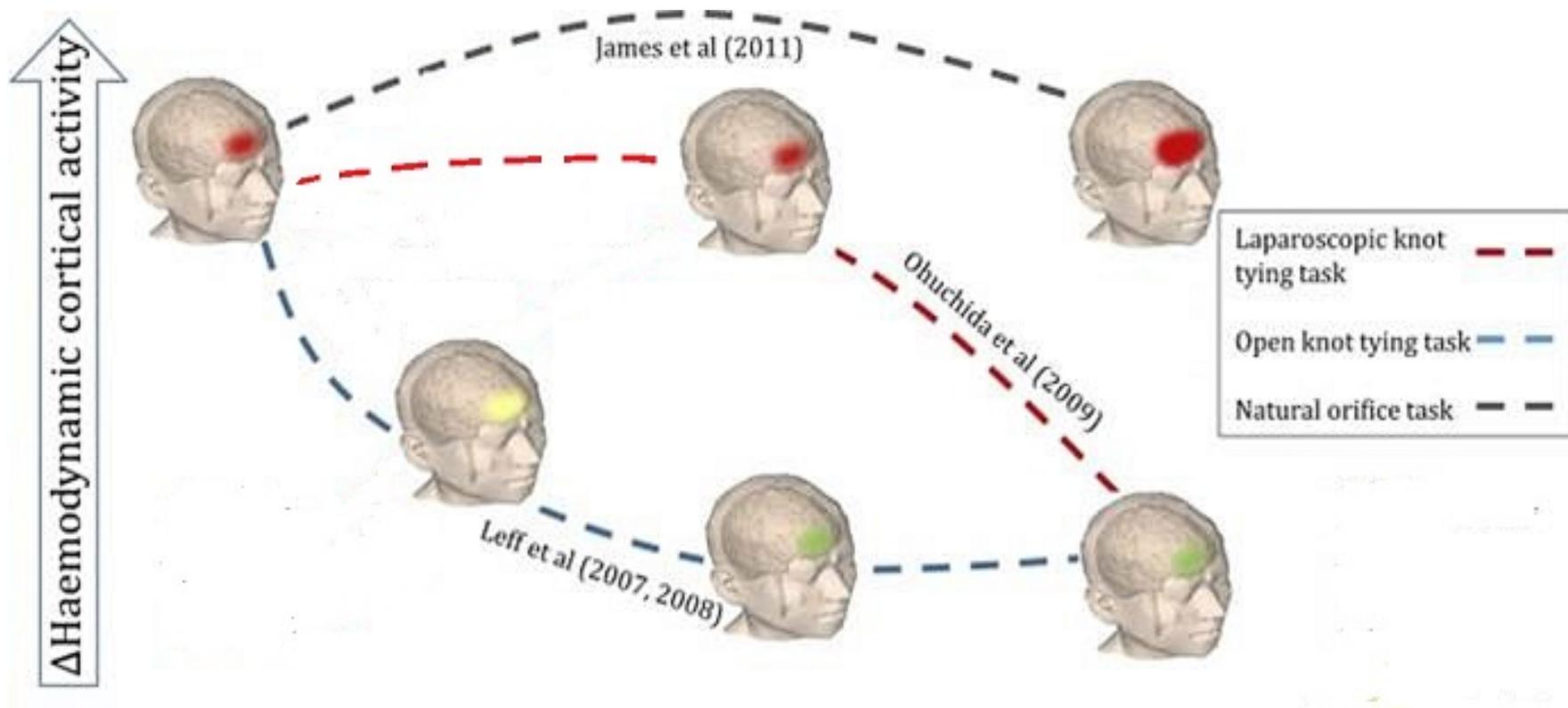
«maîtrise»
chirurgien

A Musician's Brain is Different

Studies suggest that musicians have better:

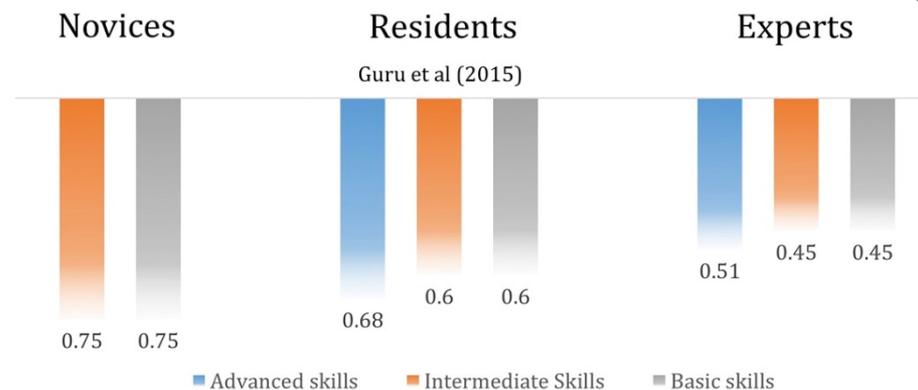
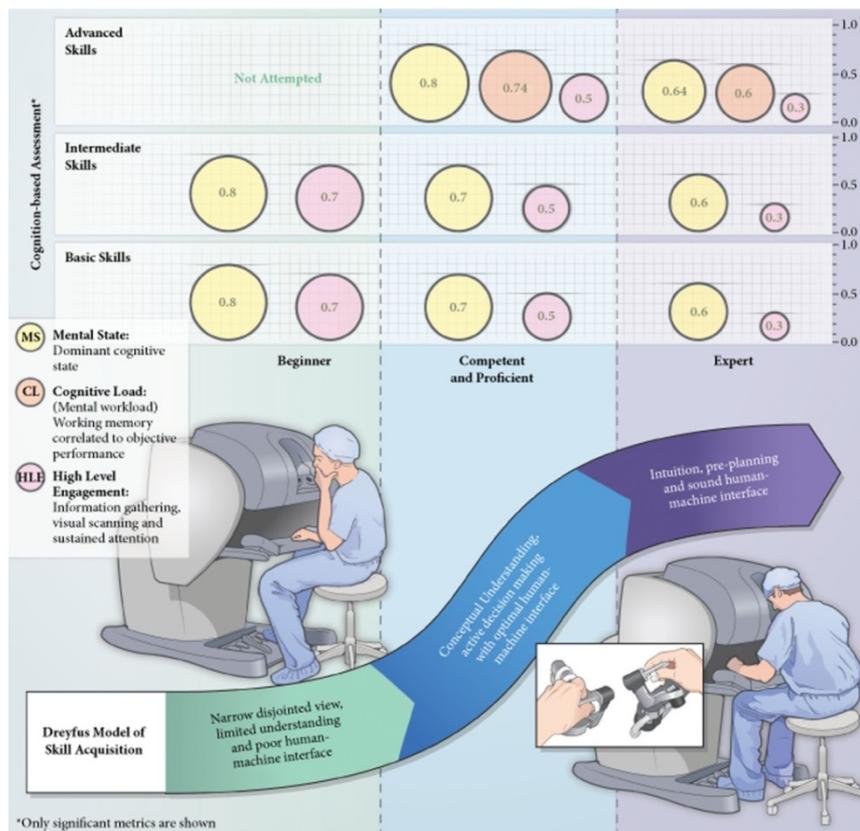


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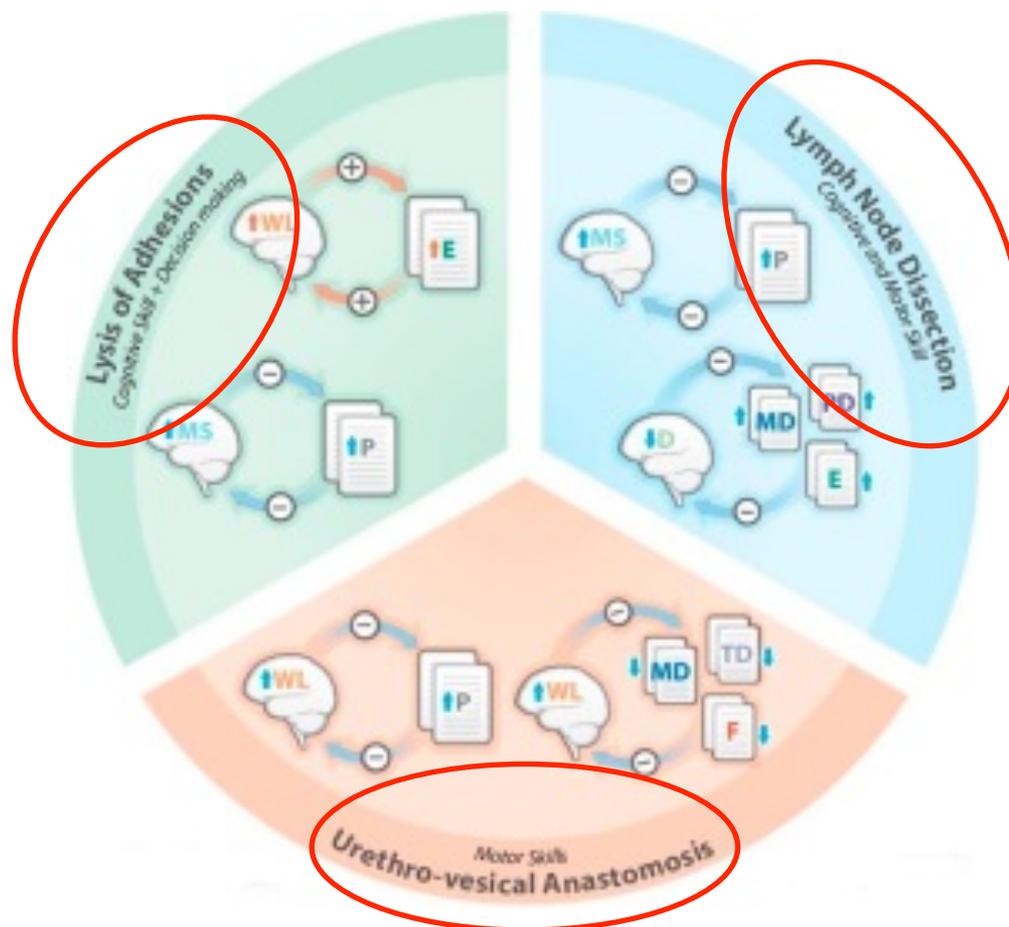
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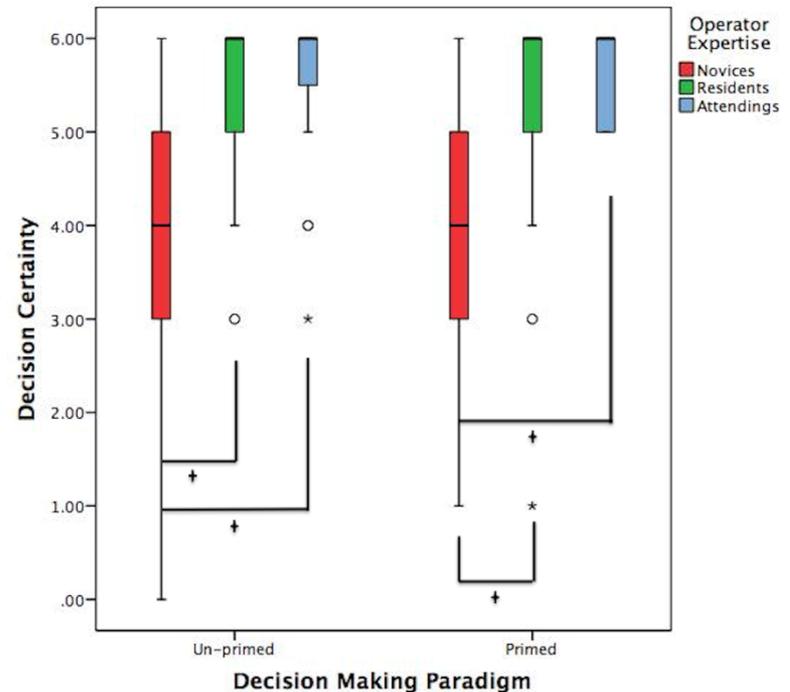
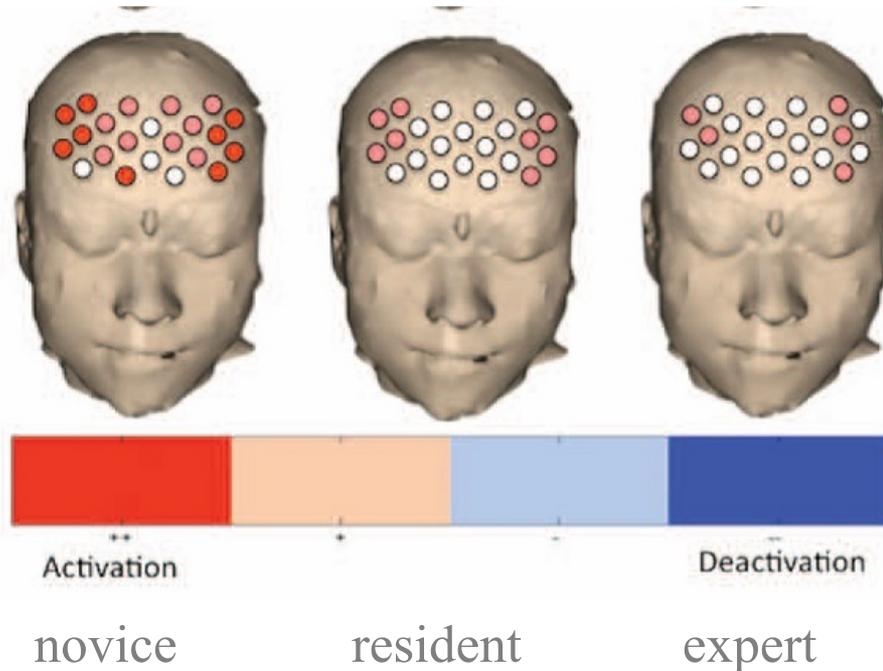
Guru KA et al. Cognitive skills assessment during robot-assisted surgery: separating the wheat from the chaff. BJU Int 2015;115:166

les musiciens ont un cerveau spécifique et plastique



Guru KA et al. Understanding cognitive performance during robot-assisted surgery.
Urology 2015;86:751

les musiciens ont un cerveau spécifique et plastique



Leff DR et al. « Contemplating the next maneuver » Functional neuroimaging reveals intraoperative decision-making strategies. Ann Surg 2017;265:320

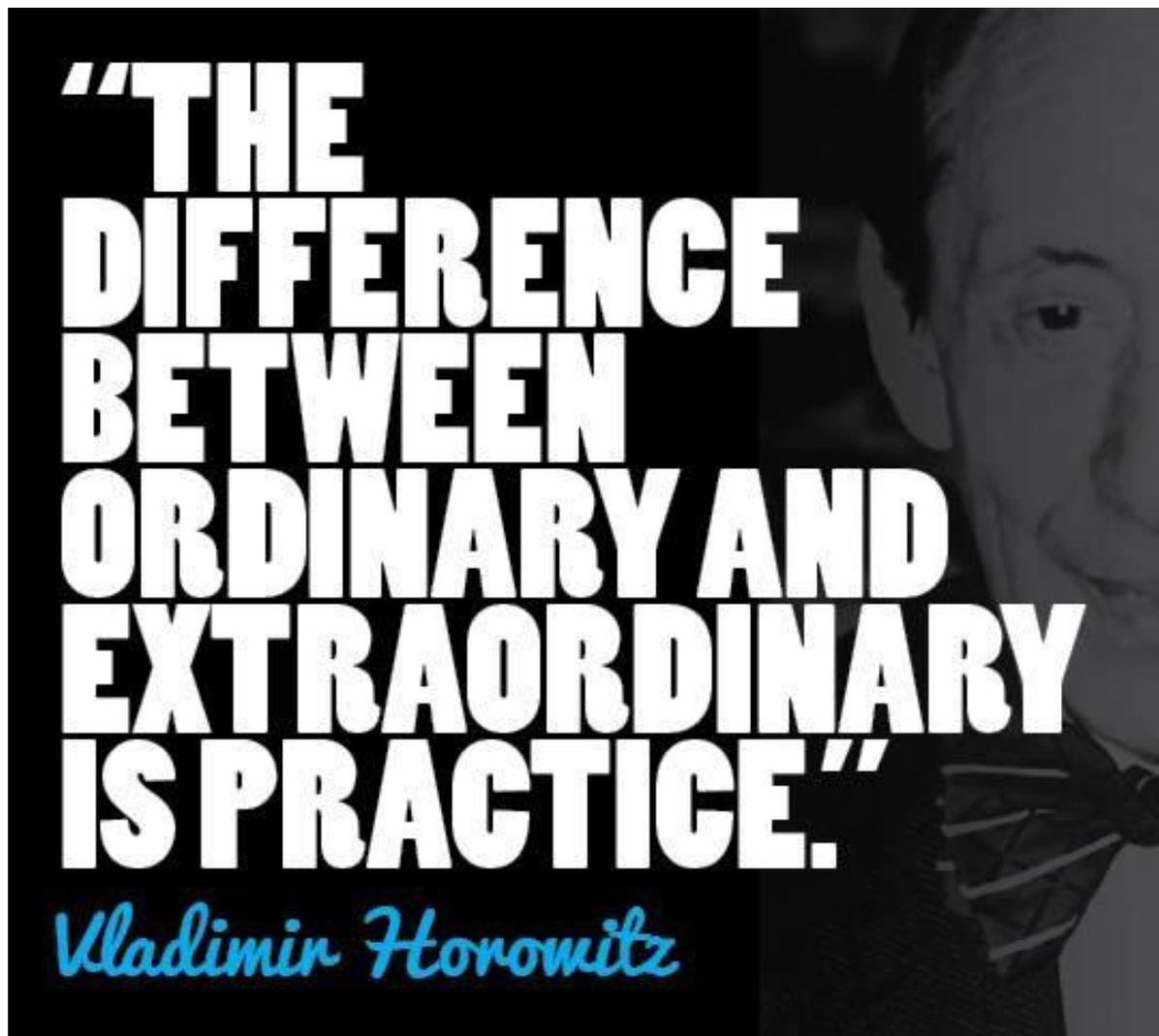
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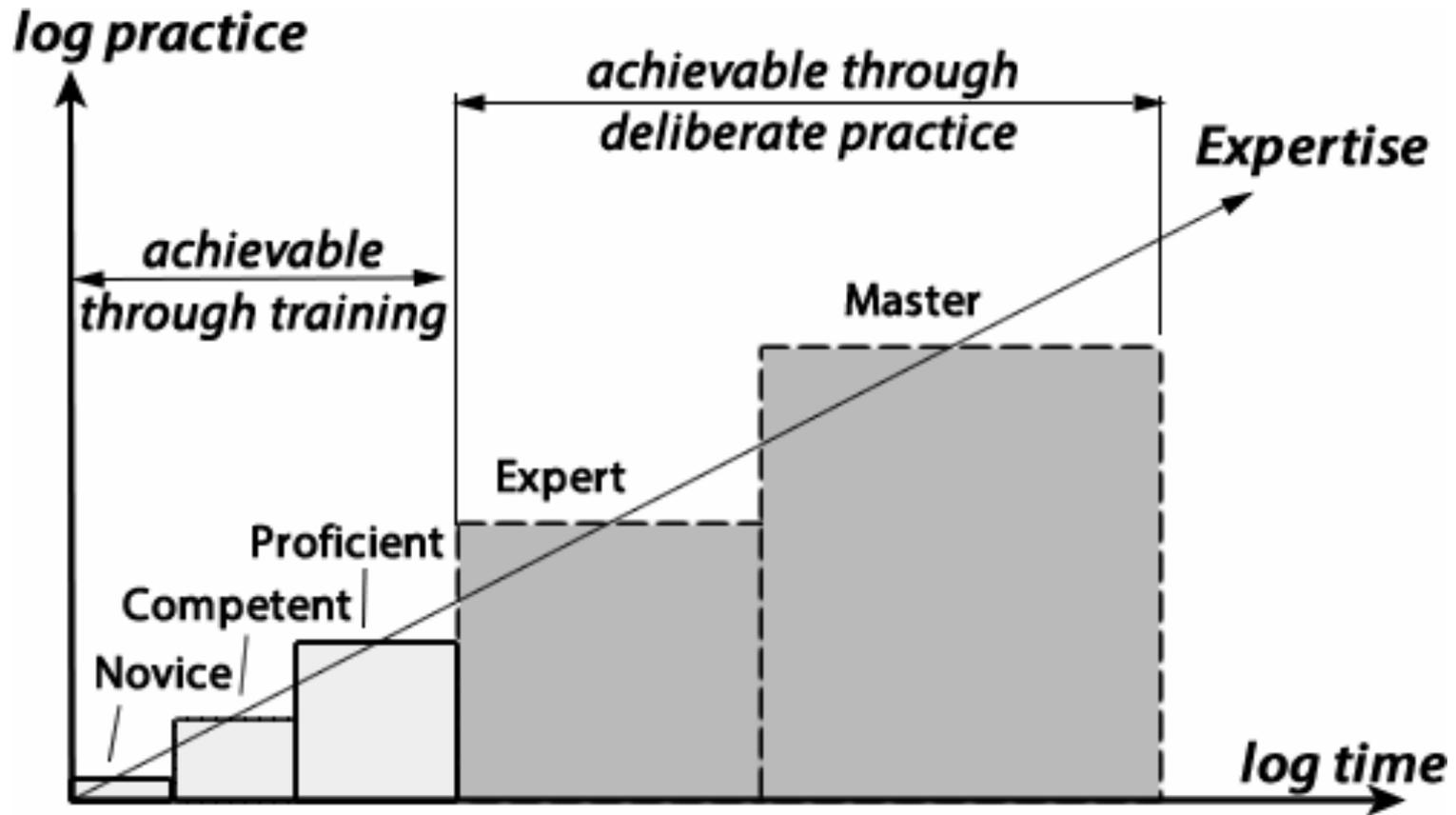
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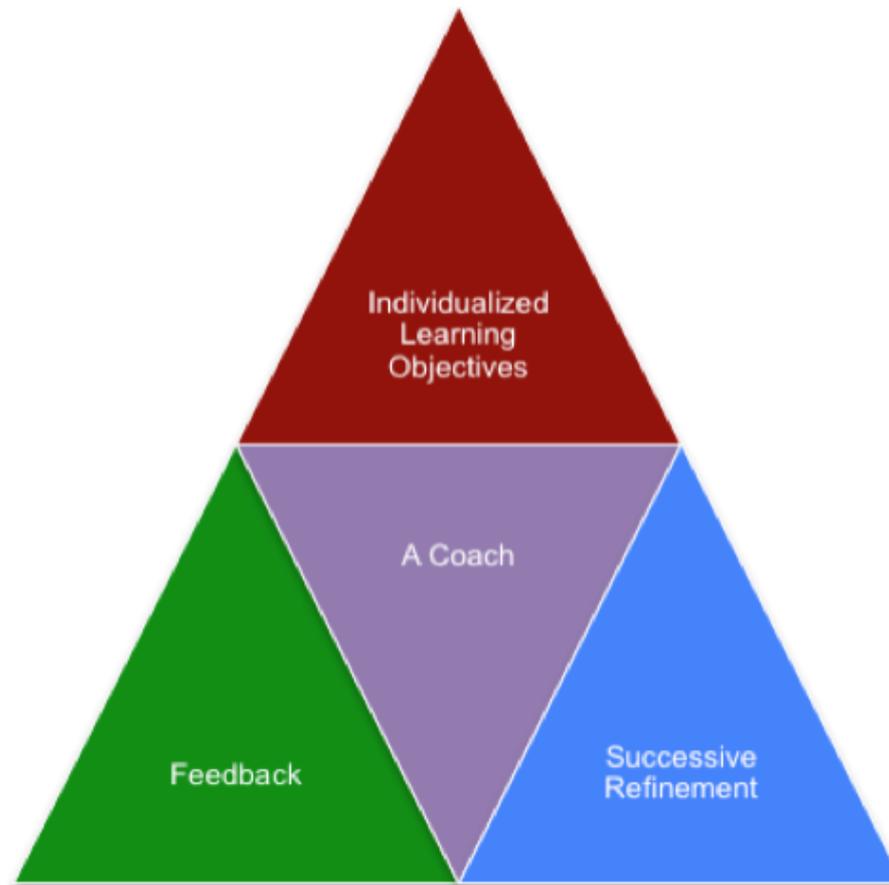


la pratique délibérée



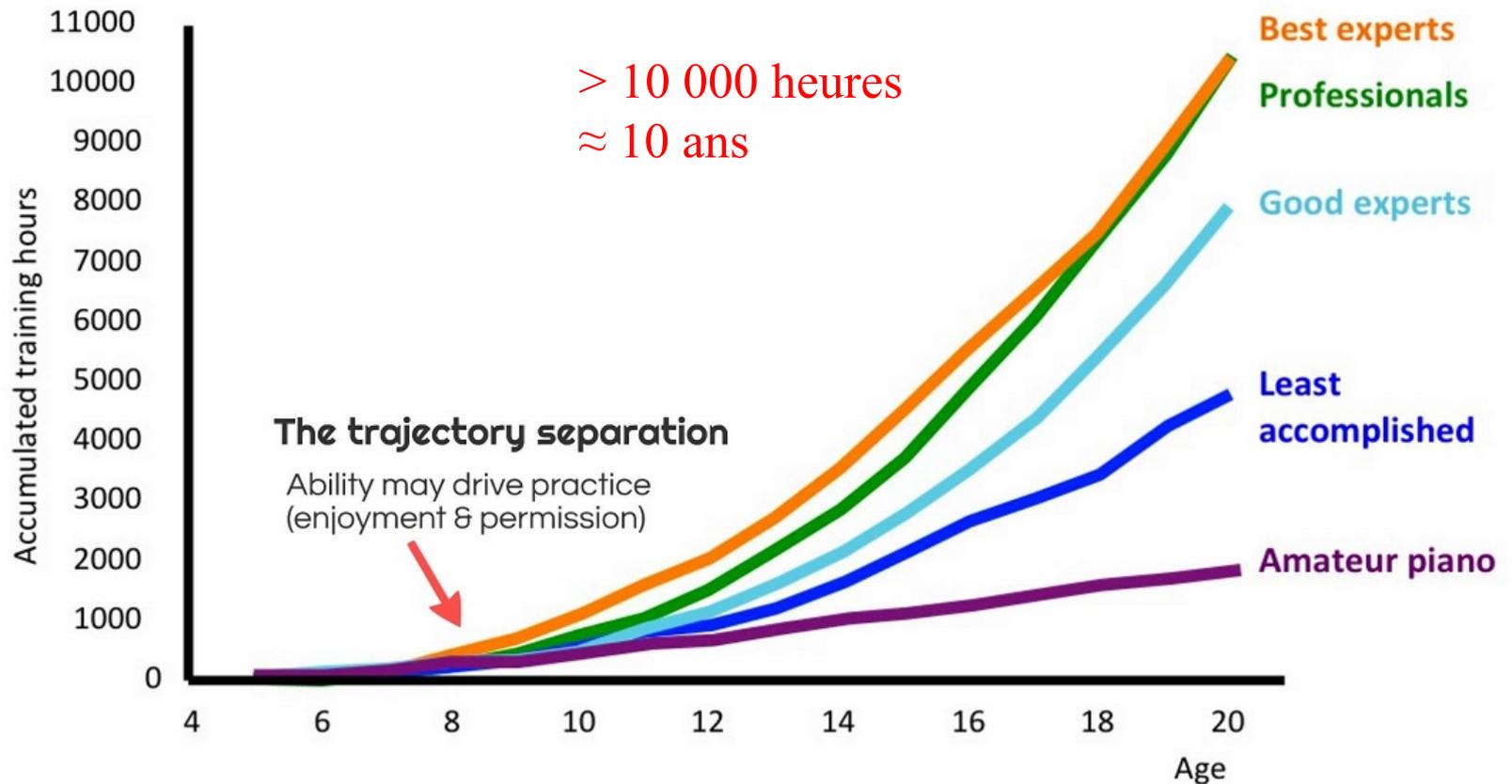
*Ericsson KA, Krampe RT, Tesch-Römer C.
The role of **deliberate practice** in the acquisition of expert performance.
Psychological Review 1993;100:363*

la pratique délibérée : 4 piliers



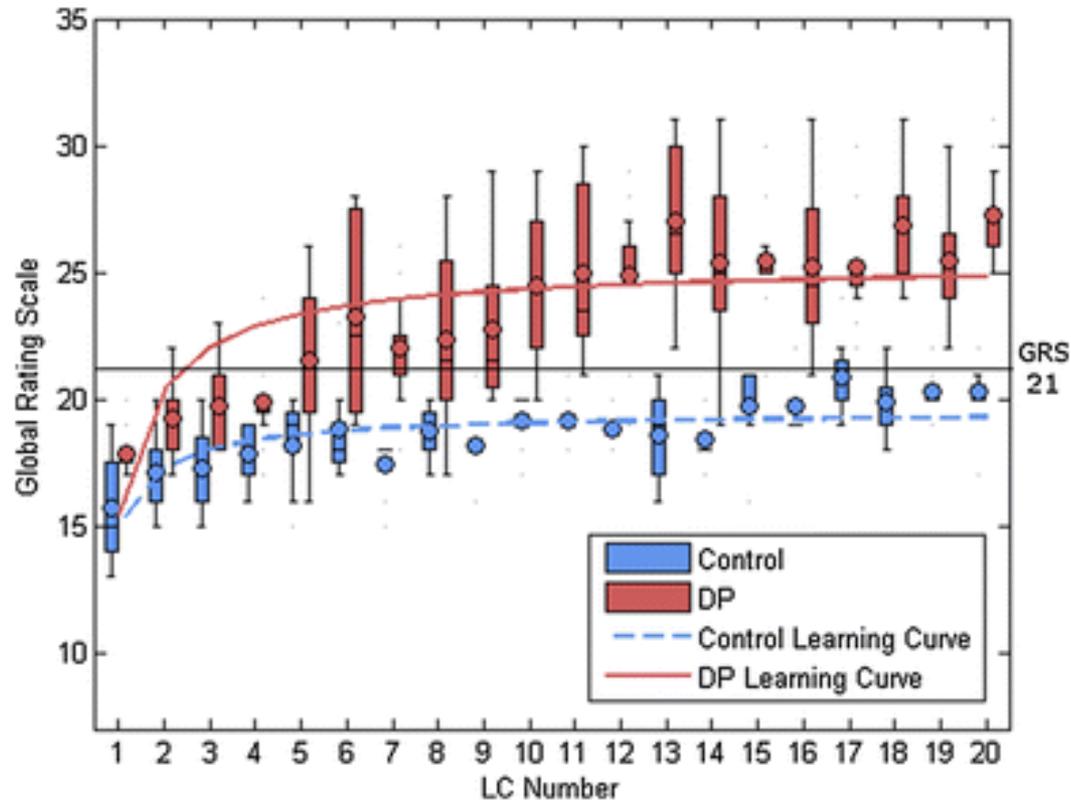
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pratique délibérée et musiciens



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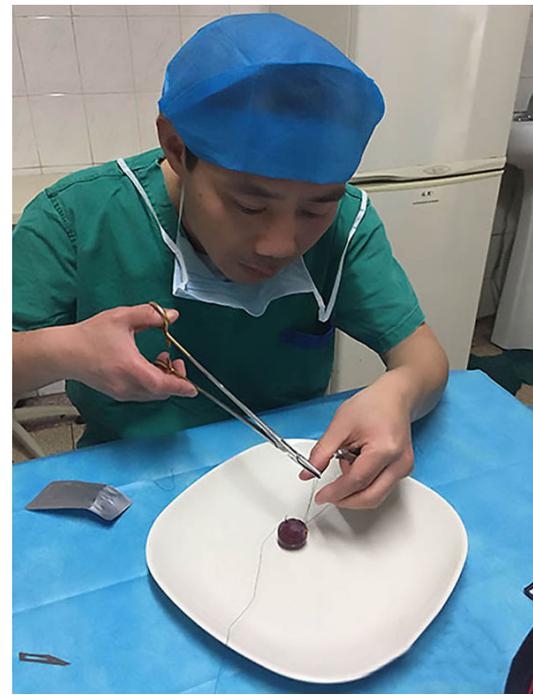
pratique délibérée et chirurgiens



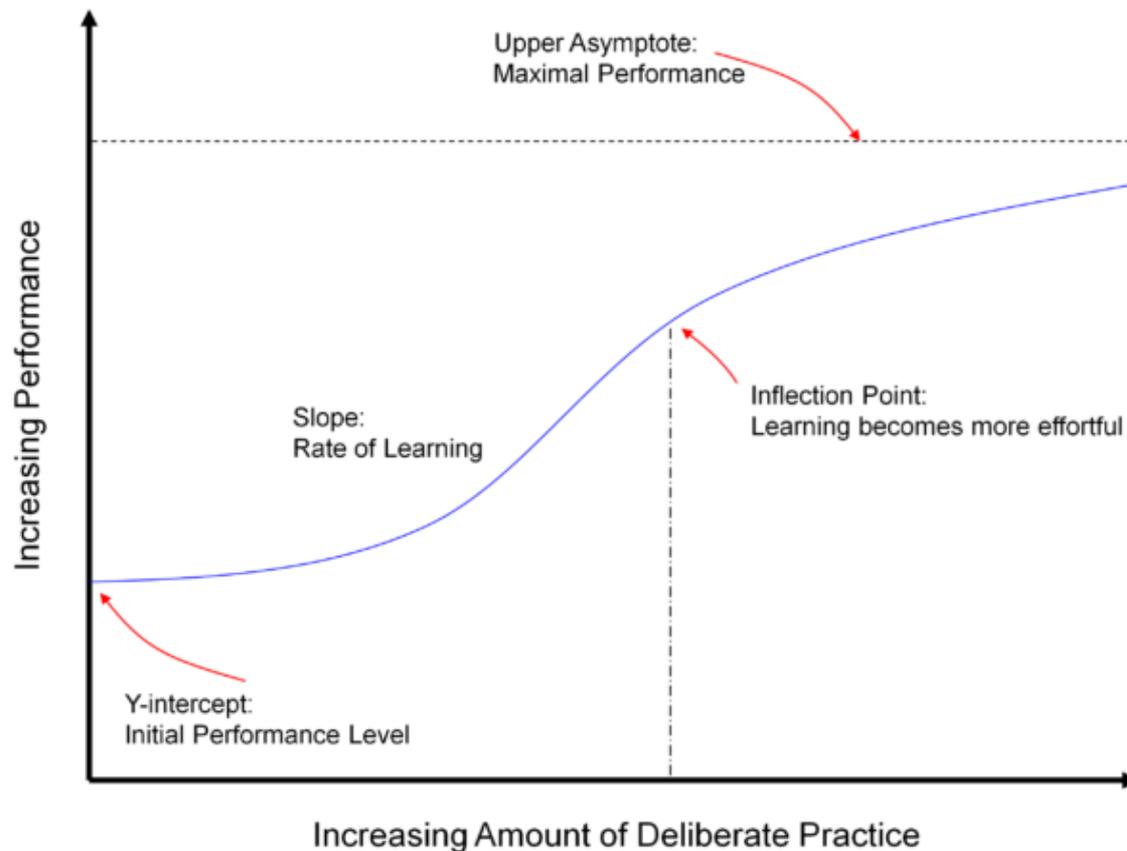
Hashimoto DA et al. Deliberate practice enhances quality of laparoscopic surgical performance in a randomized controlled trial: from arrested development to expert performance. Surg Endosc 2015;29:3154

pratique délibérée

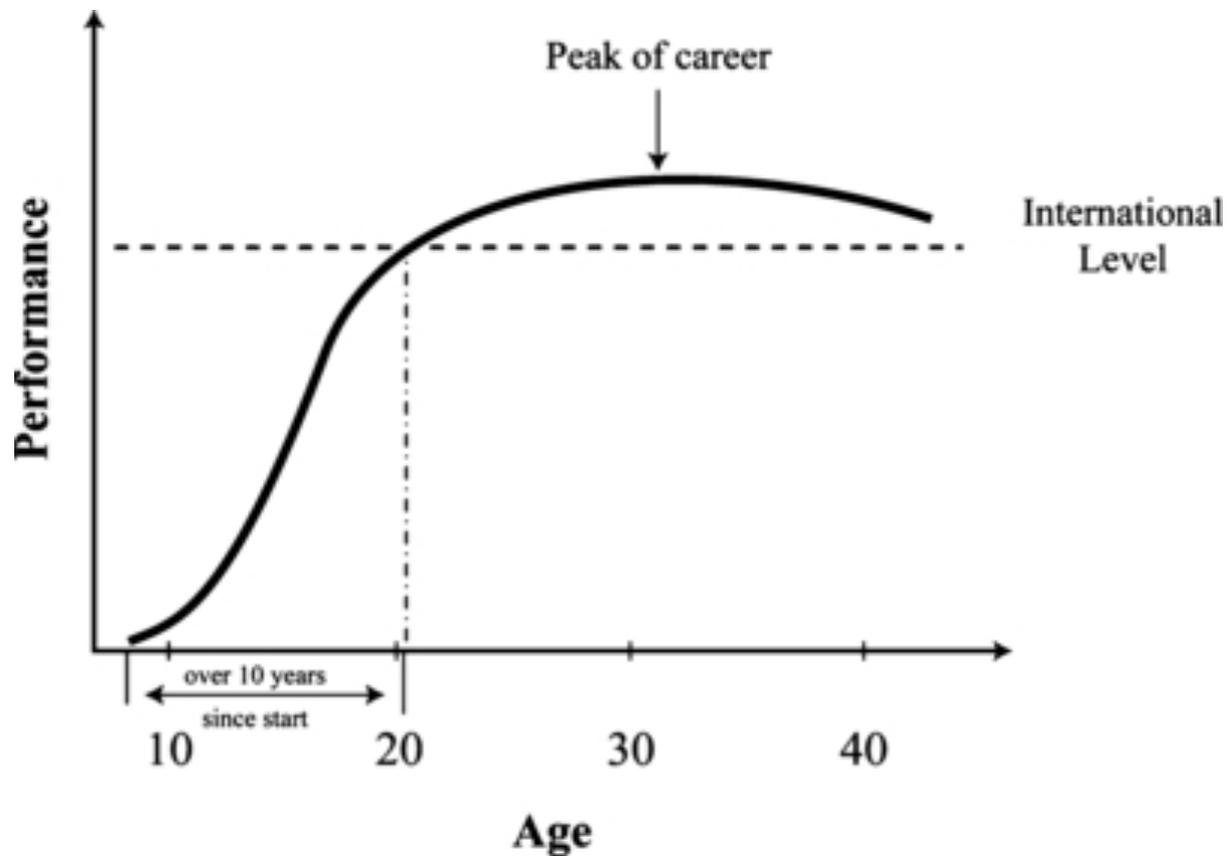
le week-end du chirurgien



pratique délibérée



pratique délibérée



When should surgeons retire?

*Bhatt NR, Morris M, O'Neil A, Gillis AZ, Ridgway PF.
BJS 2016;103:35-43*

Conclusions : Competence should be assessed at an individual level, focusing on functional ability over chronological age; this should inform retirement policies for surgeons.

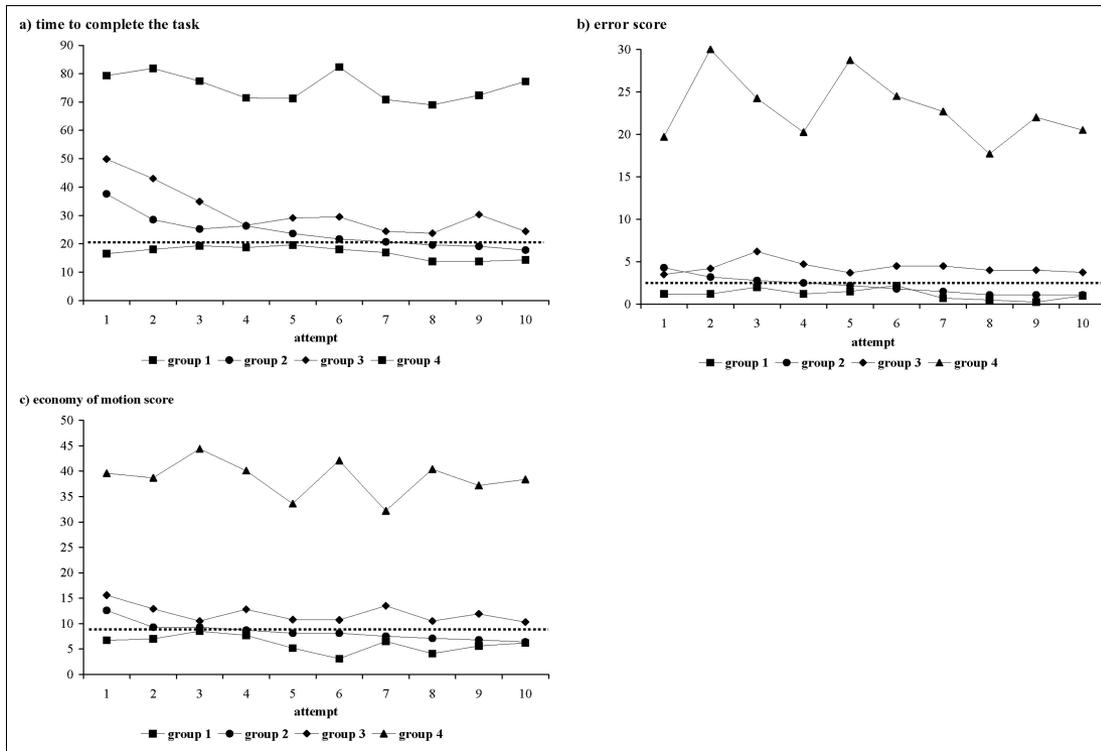


Enhancing surgical performance by adopting expert musicians' practice and performance strategies.

*Rui M, Lee JE, Vauthey JN, Conrad C.
Surgery 2018;163:894-900*

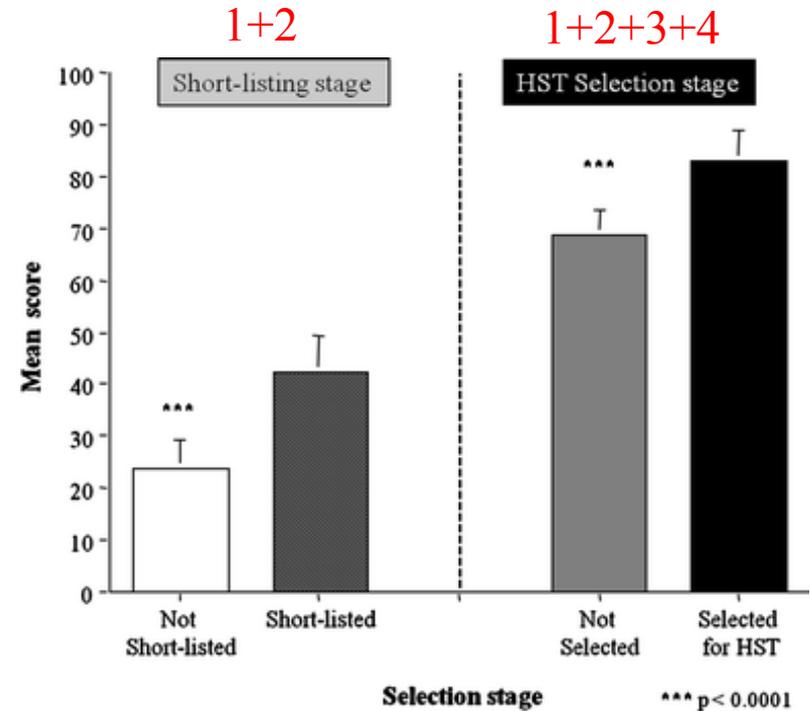
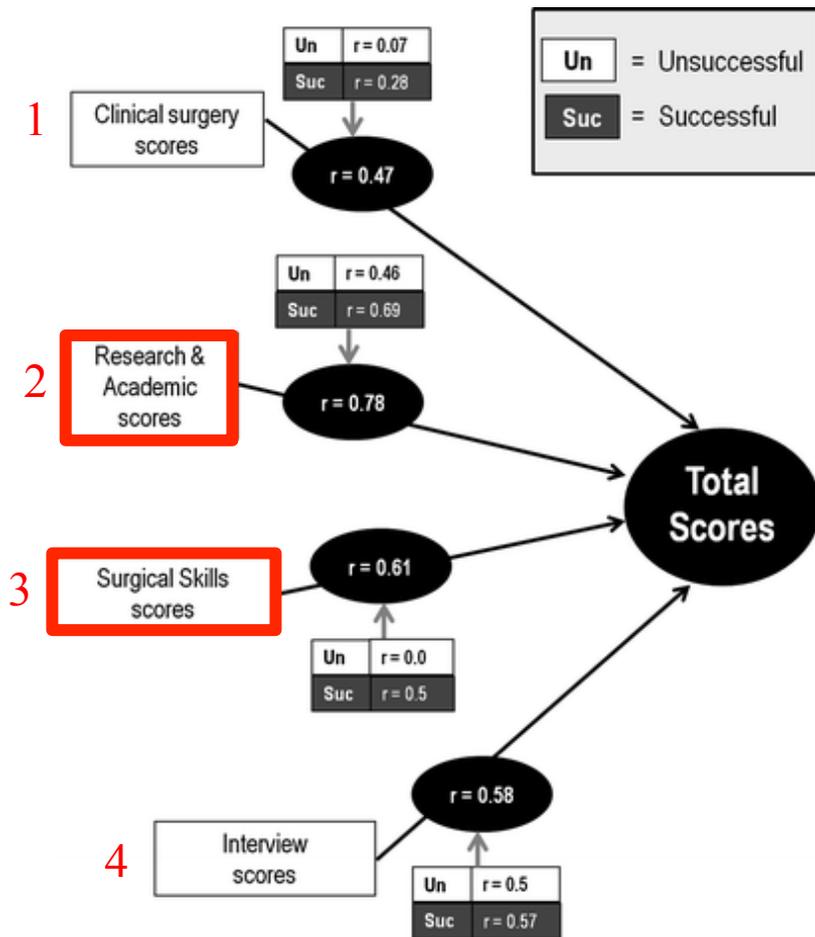
Conclusions : Critical parallels exist between surgical and expert musical performance ... Raising surgeons' awareness for this subject content may improve surgical performance and patient outcomes.

1. éliminer les candidats qui sont inaptes



Grantcharov TP et al. Can everyone achieve proficiency with the laparoscopic technique? Learning curve patterns in technical skills acquisition. Am J Surg 2009;197:447

2. sélectionner les meilleurs candidats



Gallagher AG et al. An objective evaluation of a multi-component, competitive, selection process for admitting surgeons into higher surgical training in a national setting. World J Surg 2014;38:296

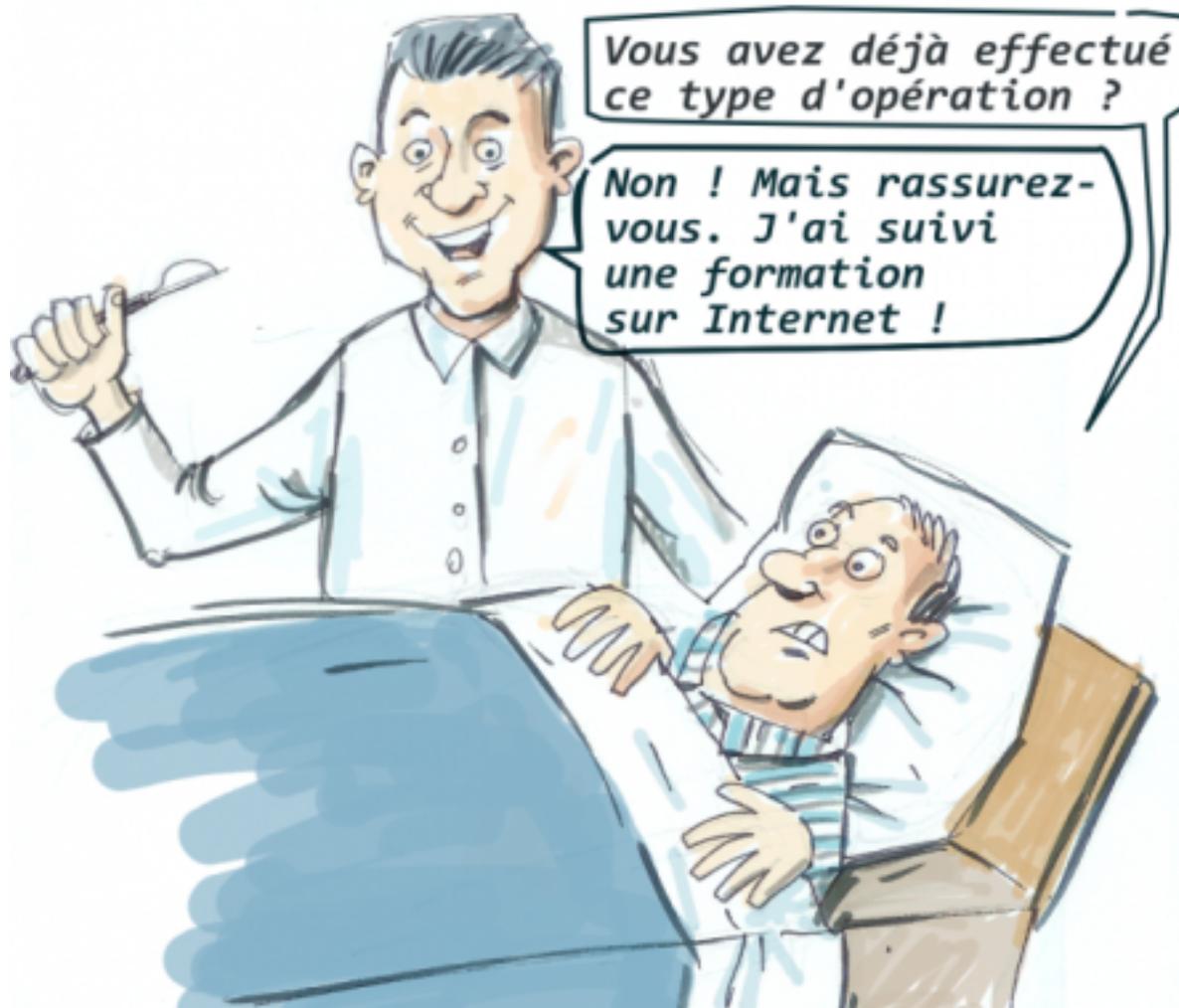
3. procurer une formation optimale :

> 10 000 heures de pratique délibérée

- . diminution réglementaire temps de présence
 - . USA : 3800 h/an
 - . Europe : 2300 h/an
- . changement de paradigme
 - . « see one, do one, teach one »
 - . « jamais la première fois sur un patient »
- . changements techniques : microchirurgie, vidéoscopie, chirurgie mini-invasive, robot



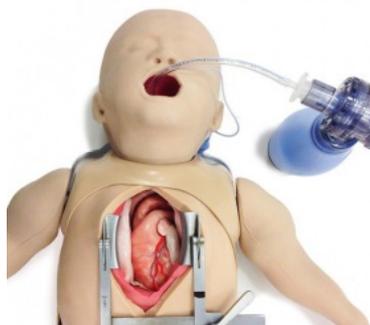
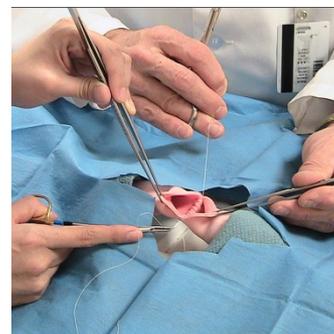
"Next, an example of the very same procedure when done correctly."



3. procurer une formation optimale : pratique délibérée

. laboratoire de chirurgie expérimentale

. **plateforme de simulation**

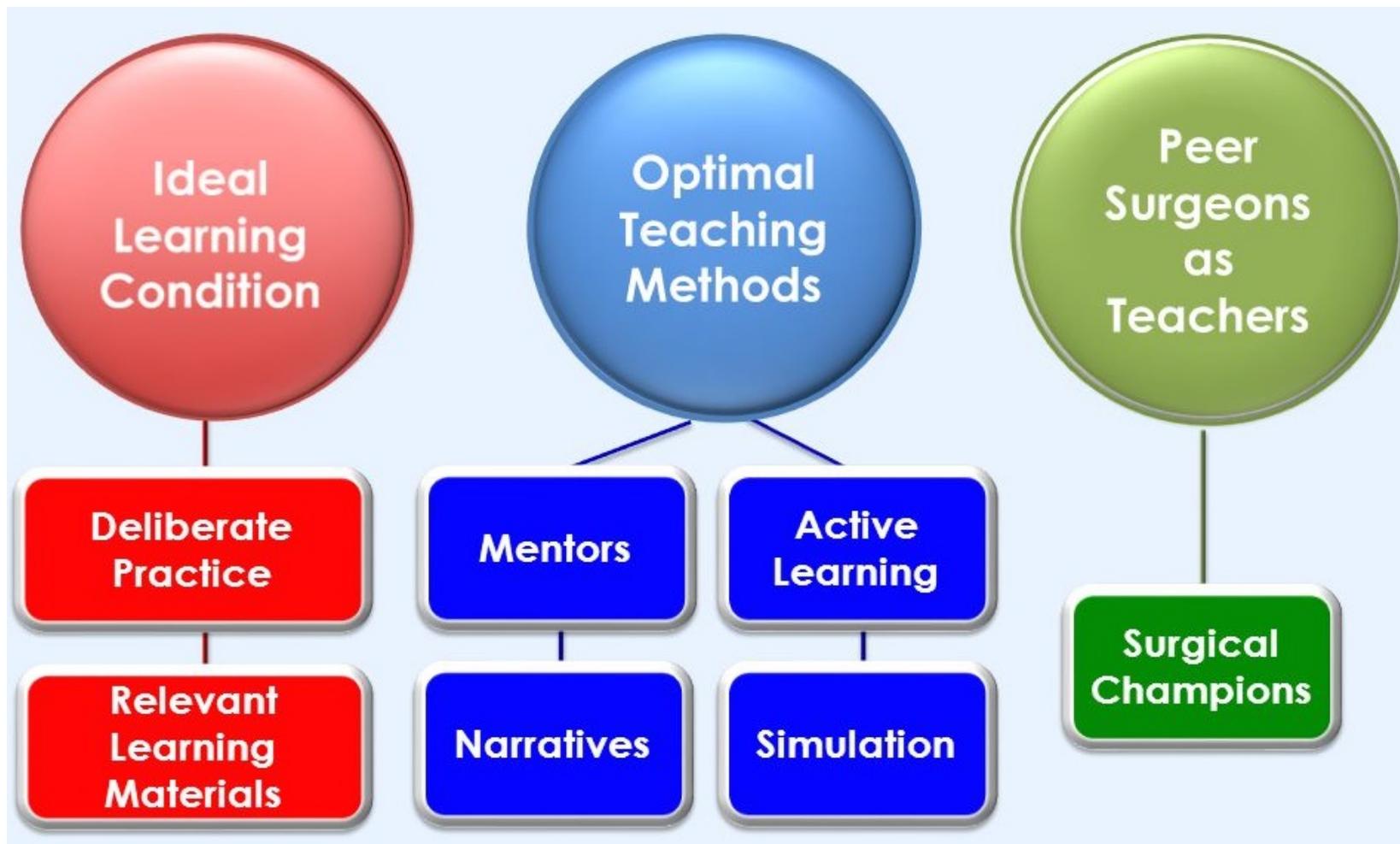




"He never starts surgery until he can play the game three times in a row without messing up."

CartoonStock.com

3. procurer une formation optimale



Situation actuelle en France



- . pas d'élimination
- . pas d'attractivité et de sélection
- . pas (pas assez) de plateformes de simulation



