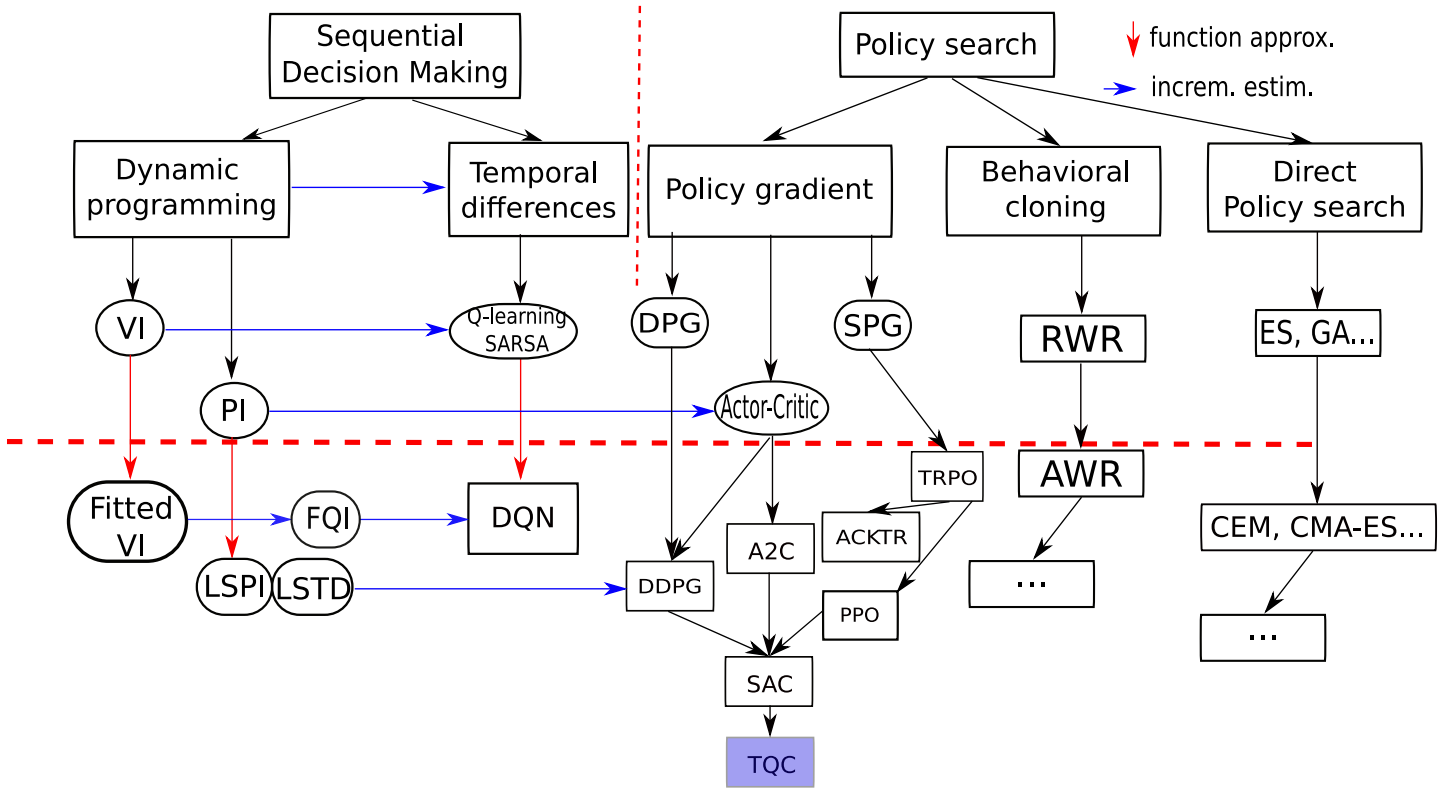
Introduction: The 5 routes to deep RL

Olivier Sigaud

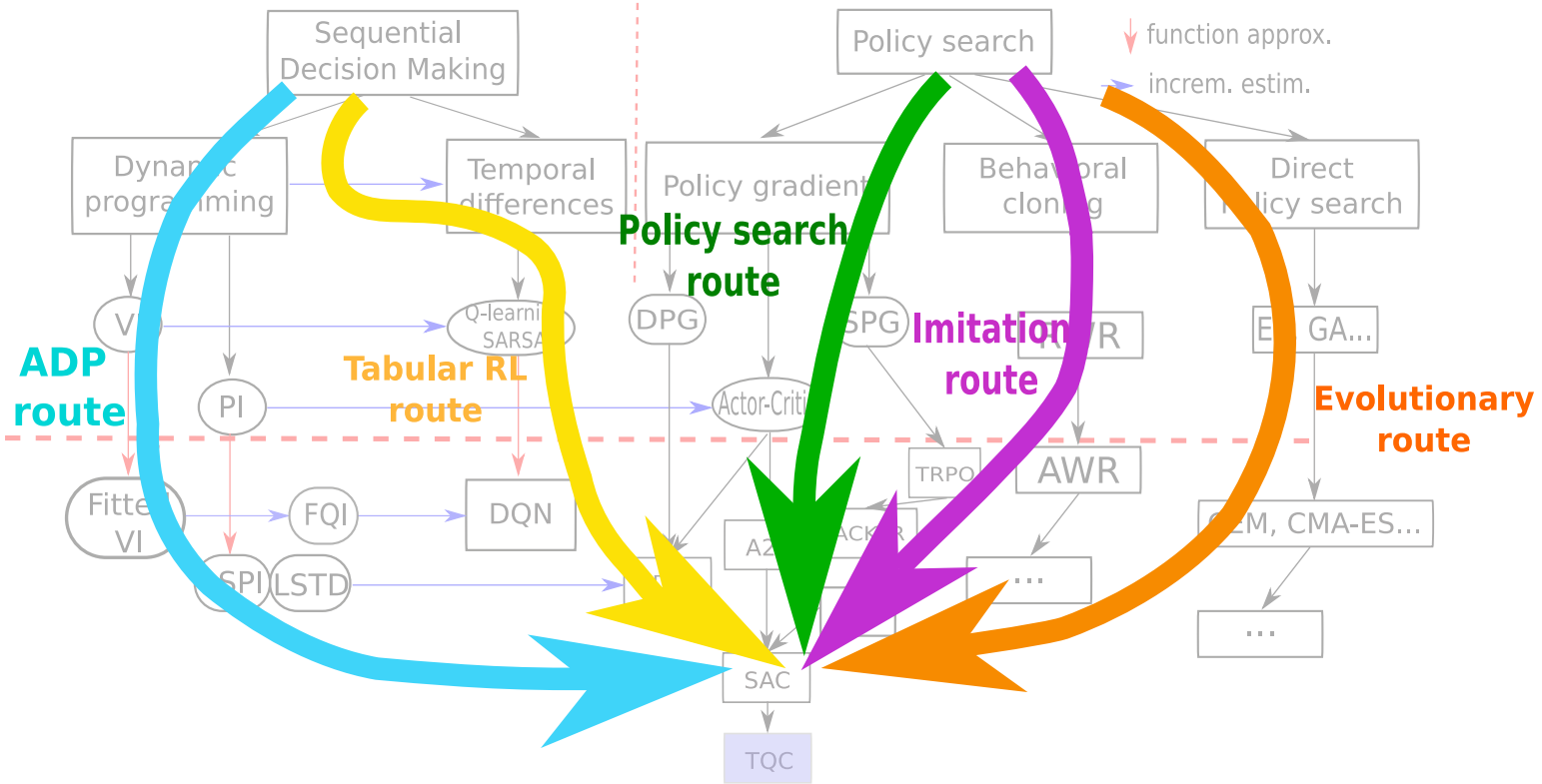
Sorbonne Université
http://people.isir.upmc.fr/sigaud

The Big Picture



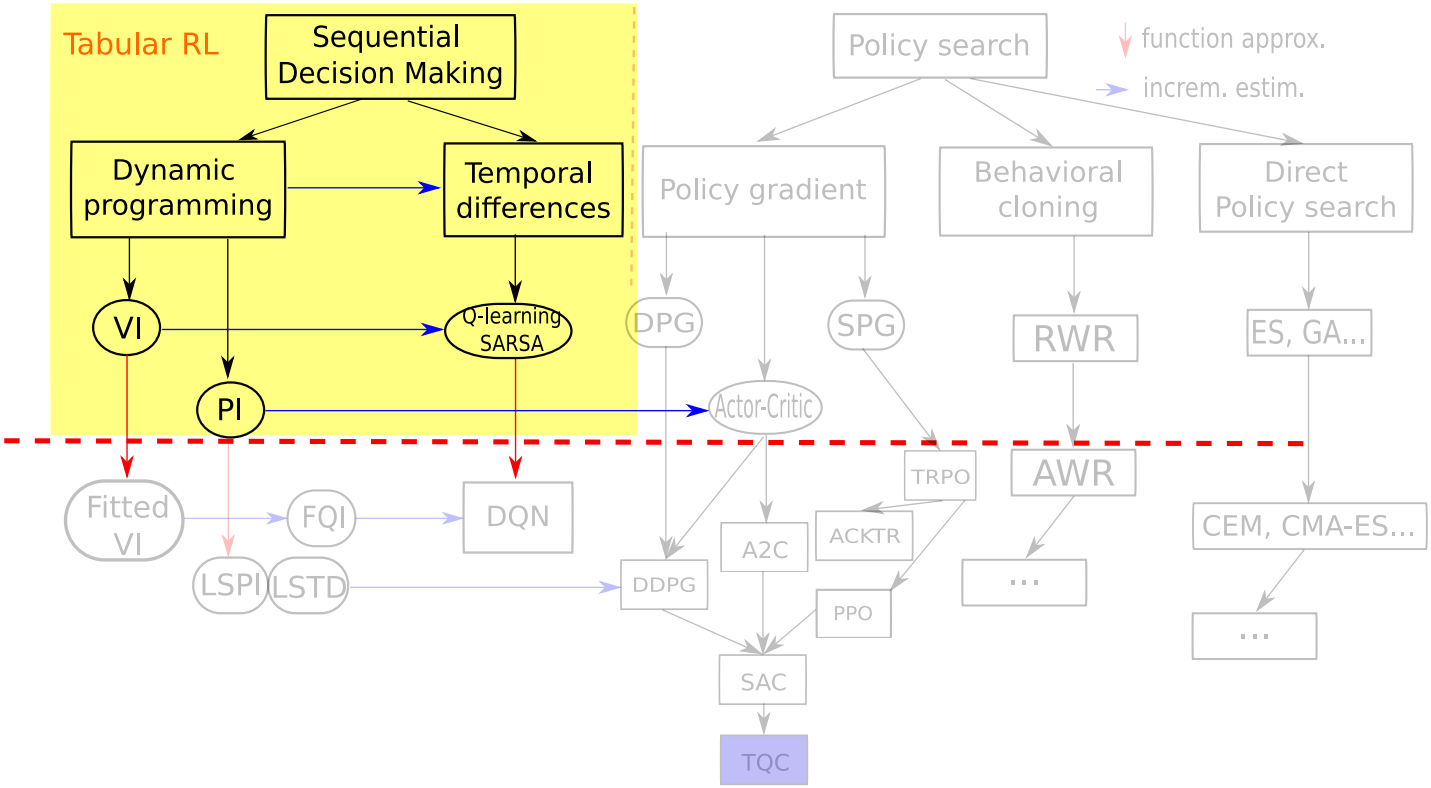
- A very partial view of the whole RL literature

The five routes to deep RL



- Five different ways to come to Deep RL

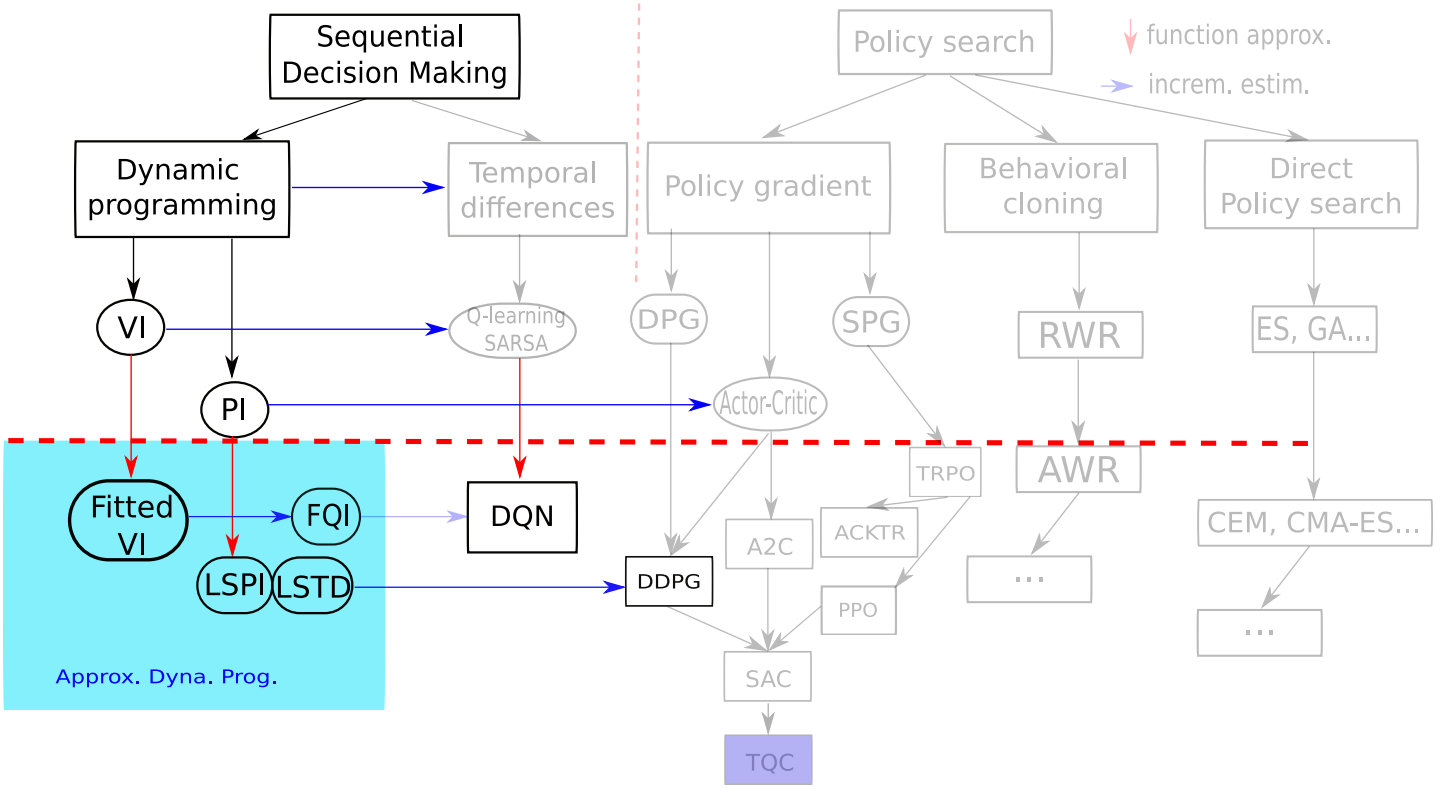
The Tabular RL route



- The favorite route of beginners
- Start from Sutton&Barto, present Q-learning, SARSA and Actor-Critic
- Add function approximation with NNs, go to DQN, then DDPG

Sutton, R. S. & Barto, A. G. (1998) *Reinforcement Learning: An Introduction*. MIT Press.

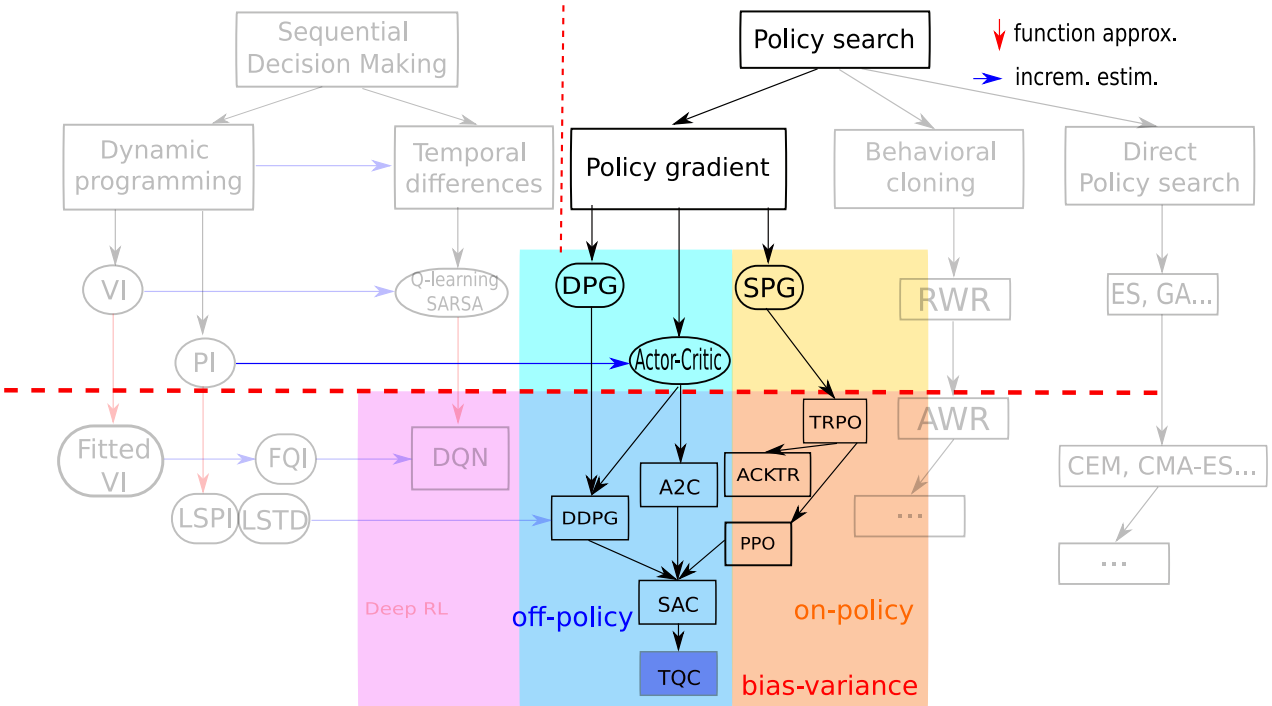
The Approximate Dynamic Programming route



- The favorite route of mathematicians
- I never travelled this route

Warren B. Powell. *Approximate Dynamic Programming: Solving the curses of dimensionality*, volume 703. John Wiley & Sons, 2007

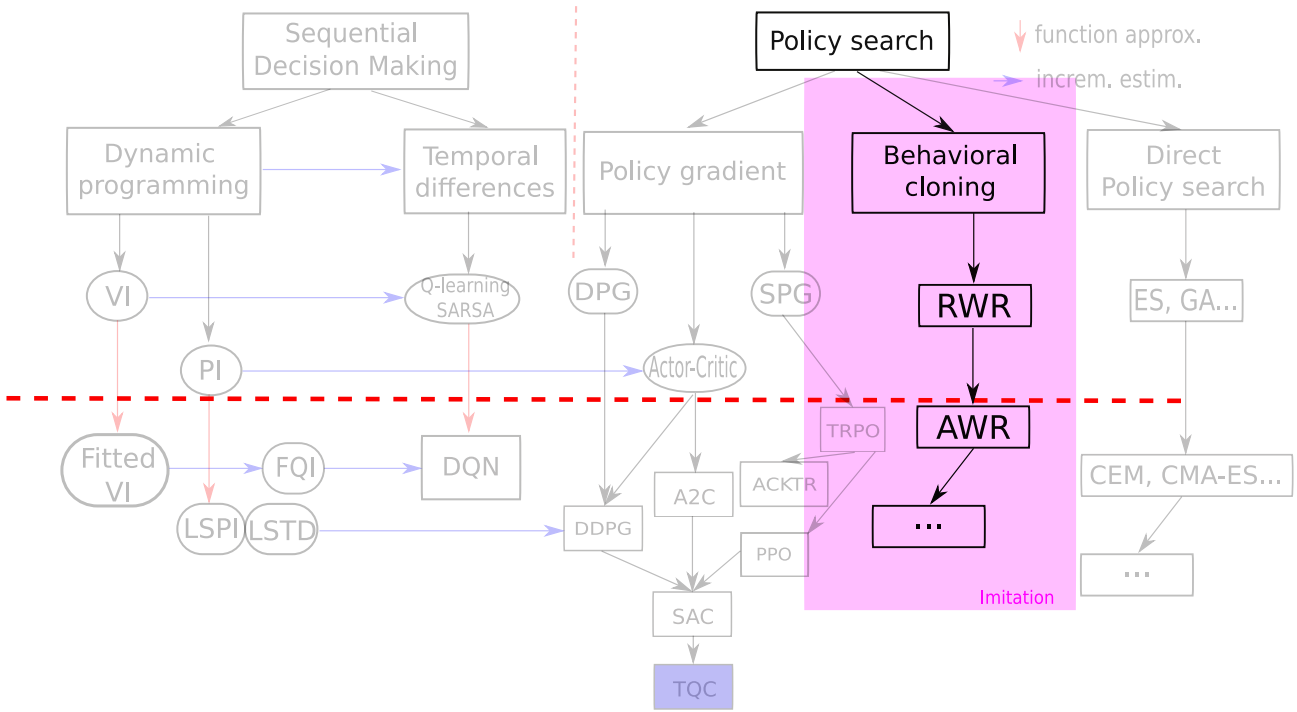
The Policy Search route



- The favorite route of roboticists
- The one I'm travelling in these lessons
- Central question: difference between PG with baseline and Actor-Critic

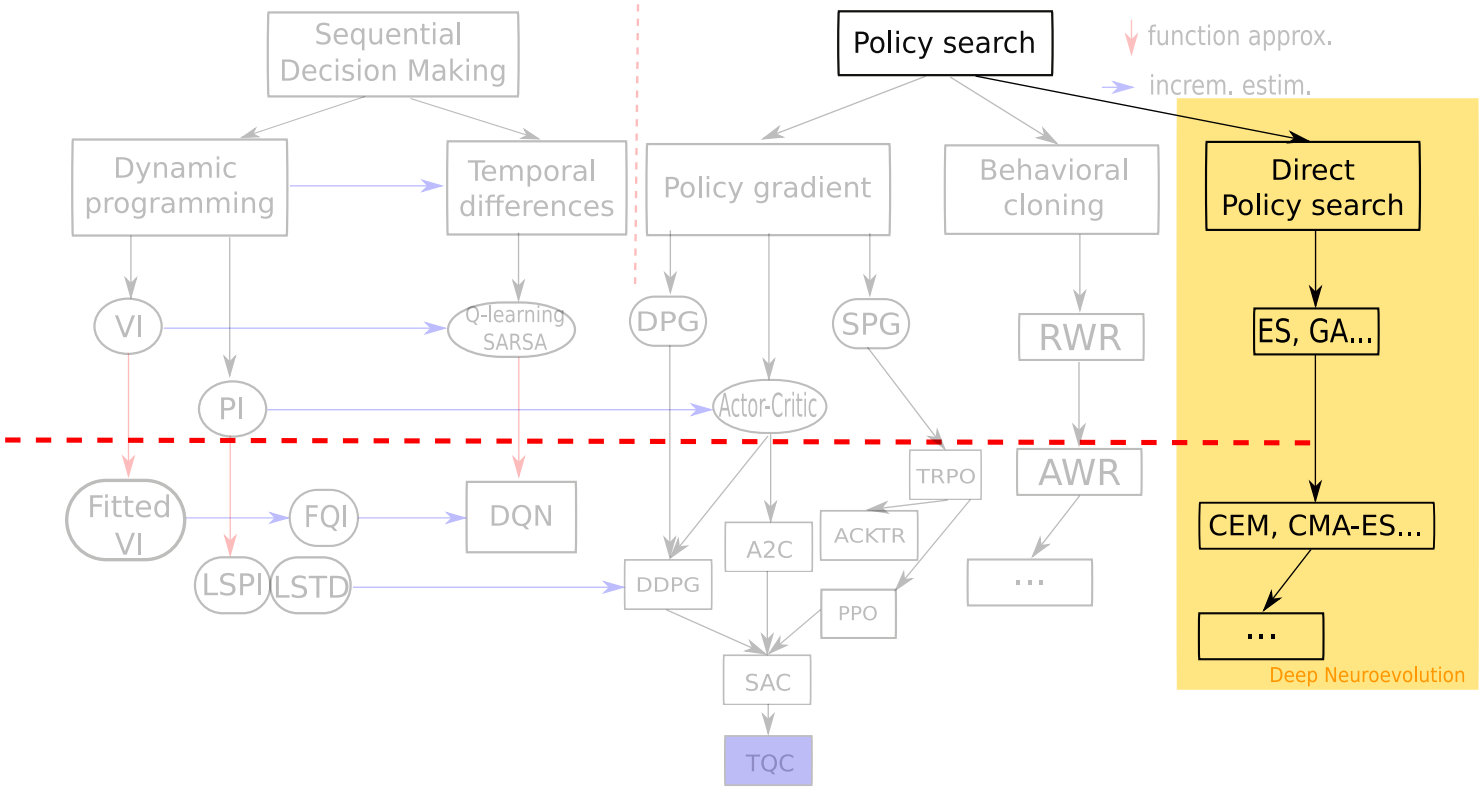
Marc P. Deisenroth, Gerhard Neumann, Jan Peters, et al. A survey on policy search for robotics. *Foundations and Trends® in Robotics*, 2(1–2):1–142, 2013

The Imitation learning route



- A very efficient route, with growing interest

The Evolutionary route



- The favorite route of black-box optimisation people
- Much more efficient than RL people think

Tim Salimans, Jonathan Ho, Xi Chen, and Ilya Sutskever. Evolution strategies as a scalable alternative to reinforcement learning. *arXiv preprint arXiv:1703.03864*, 2017

Any question?

Send mail to: Olivier.Sigaud@upmc.fr

Deisenroth, M. P., Neumann, G., Peters, J., et al. (2013).

A survey on policy search for robotics.
Foundations and Trends® in Robotics, 2(1–2):1–142.

Powell, W. B. (2007).

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John Wiley & Sons.

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