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# Presentation 49: How does the brain control the eye movements? An analysis-by-synthesis approach.

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The development of biologically accurate models has enabled biologists and neurologists to study and investigate the mechanisms of biological processes without having to interfere with, and potentially damage, the real system.
The human body comprises a vast number of complex systems, and this work aims to study one of these - the control of human eye motion.
To that end, a physical model of a biomimetic robotic eye equipped with six tendons that provide the eye with six degrees of freedom (DOF) and biologically realistic properties is used to study the control strategies employed by the brain to plan and execute fast and accurate (saccadic) eye movements. The control of saccades is formulated as an optimization process that takes into account factors ('costs') such as error, duration and energy consumption. To find the optimal control strategies, a Reinforcement Learning optimization algorithm is employed to create a controller interface capable of generating optimal trajectories that minimize the total movement cost.
With this formulation, we expect that our model can replicate human-like saccadic motion, without imposing any additional constraints or a priori knowledge of the real system. The results will be compared to real-life measurements from human saccades to confirm the validity of the developed model.

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