Perceptual coupling with ProMPs

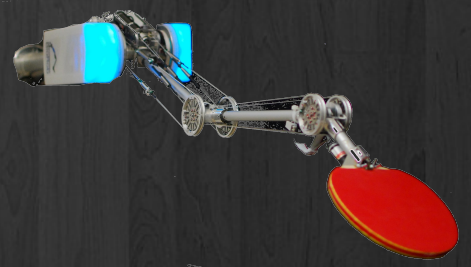
➔Modify the movement primitive according to observations of external, uncontrollable, variables (e.g. modify the robot's joint trajectories by observing the ball position)

➔Goal: create a controller that depends on the observations of the external variables. Learn by imitation/interaction

➔First step – modulate primitive by conditioning the distribution

$$f_{\boldsymbol{Y}}(\boldsymbol{y}|\boldsymbol{Y}^{\text{ext}} = \boldsymbol{y}^*) \propto f_{\boldsymbol{Y},\boldsymbol{Y}^{\text{ext}}}(\boldsymbol{y}, \boldsymbol{y}^*)$$

➔ Real robot application on BioRob robot(s) for playing tether-ball or the Barrett arm for playing table tennis.



Ref: Paraschos, A.; Daniel, C.; Peters, J.; Neumann, G (2013). Probabilistic Movement Primitives, Advances in Neural Information Processing Systems (NIPS), Cambridge, MA: MIT Press.