**S1 Proof: Direct proof demonstrating that the expected value of control (EVC) is equivalent to a Q-function with a compound reward that incorporates the cost of action.**

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1. Shenhav A, Botvinick MM, Cohen JD. The Expected Value of Control: An Integrative Theory of Anterior Cingulate Cortex Function. Neuron. 2013 Jul;79(2):217–40.

2. Richard S. Sutton, Andrew G. Barto. Reinforcement Learning: An Introduction. Cambridge, MA: MIT Press; 1998.