

# Joint Goal Human Robot collaboration-From Remembering to Inferring

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## Abstract

The ability to infer goals, consequences' of one's own and others actions is a critical desirable feature for robots to truly become our companions-thereby opening up applications in several domains. This article proposes the viewpoint that the ability to remember our own *past* experiences based on *present* context enables us to infer *future* consequences of both our actions/goals and observed actions/goals of the other (by analogy). In this context, a biomimetic episodic memory architecture to encode diverse learning experiences of iCub humanoid is presented. The critical feature is that partial cues from the present environment like objects perceived or observed actions of a human triggers a recall of context relevant past experiences thereby enabling the robot to infer rewarding future states and engage in cooperative goal-oriented behaviors. An assembly task jointly done by human and the iCub humanoid is used to illustrate the framework. Link between the proposed framework and emerging results from neurosciences related to shared cortical basis for 'remembering, imagining and perspective taking' is discussed.

*Keywords:* Human robot collaboration, Robot episodic memory, iCub humanoid, internal simulation, Cumulative learning

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