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Human-inspired manipulation using pre-grasp object interaction

Human manipulation provides compelling examples of how robots could interact with the environment. I will present my work on the human strategy of pre-grasp object manipulation, where the object acquisition process includes object adjustment in the environment before the final grasp is achieved. Our studies first look at human performance of this strategy for grasping heavy or hard-to-reach objects. We have also examined how human pre-grasp interaction changes with respect to task conditions. From these lessons, we have developed initial approaches for robot pre-grasp interaction. We have demonstrated that pre-grasp interaction can extend the effective workspace of a well-tuned grasping action for anthropomorphic manipulator. In addition, we have developed a method for strategically selecting transition points to plan a complete grasping progress what incorporates pre-grasp object rotation with grasp acquisition and post-grasp object transport. Future research to generalize and automatically learn and execute this strategy for robots will require object representations that include the important features for pre-grasp interaction.