

ABSTRACT

Existing computational theories of collaboration explain some of the important concepts underlying collaboration, e.g., the collaborators' commitments and communication. However, the underlying processes required to dynamically maintain the elements of the collaboration structure are largely unexplained. Our main insight is that in many collaborative situations acknowledging or ignoring a collaborator's affective state can facilitate or impede the progress of the collaboration. This implies that collaborative agents need to employ affect-related processes that (1) use the collaboration structure to evaluate the status of the collaboration, and (2) influence the collaboration structure when required. This thesis develops a new affect-driven computational framework to achieve these objectives and thus empower agents to be better collaborators. Contributions of this thesis are: (1) Affective Motivational Collaboration (AMC) theory, which incorporates appraisal processes into Shared-Plans theory. (2) New computational appraisal algorithms based on collaboration structure. (3) Algorithms such as goal management, that use the output of appraisal to maintain collaboration structures. (4) Implementation of a computational system based on AMC theory. (5) Evaluation of AMC theory via two user studies to a) validate our appraisal algorithms, and b) investigate the overall functionality of our framework within an end-to-end system with a human and a robot.