Spoken Conversational Tutor (SCoT)

Human tutoring is known to be more effective than classroom instruction (Bloom 1984). Sophisticated intelligent tutoring systems (ITS), however, are only about half as effective as human tutors (Graesser et al. 2001). To approach the effectiveness of human tutors, ITS may need to not only use sophisticated tutoring strategies, but also use natural language dialogue (Graesser et al. 2001).

How should dialogue be modeled as part of an ITS? One approach has been to catalogue the dialogue moves found in human tutorial dialogues, and realize them as states in finite state automata that govern the dialog move option space for any input. This approach intertwines the mechanisms of dialogue (e.g., discourse markers, turn management) with the mechanisms of tutoring (e.g., hints, explanations). The joint activity theory (Clark 1996) separates conversational intelligence, i.e. how to use dialogue mechanisms in conversation, from the activity that a dialogue accomplishes. This separation provides for a clearer representation of how and why the structure of a task changes the structure of a dialogue.

Joint activities are activities in which participants have to coordinate their individual actions to succeed (e.g., a tutor identifying and addressing a student’s misconceptions), using language and other signals. The functions of many of these signals are shared across domains (e.g., discourse markers), whereas dialogue structure varies as a consequence of the activity the dialogue serves. This suggests that linguistic knowledge should be kept separate from domain knowledge in an ITS.

We have adopted the joint activity approach in the development of a spoken conversational tutor (SCoT). SCoT is composed of three separate components: a knowledge base, a dialogue manager (the component that handles conversational intelligence), and a tutor. SCoT is developed within the Architecture for Conversational Intelligence (ACI; Lemon et al. 2001), a general purpose architecture which supports multi-modal, mixed-initiative dialogues with devices.