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ASPECTS COGNITIFS DES DIALOGUES ENTRE AGENTS ARTIFICIELS
L'approche par la cohérence cognitive

Thèse présentée
à la Faculté des études supérieures de l'Université Laval
dans le cadre du programme de doctorat en Informatique
pour l'obtention du grade de Philosophiæ Doctor, (Ph.D.).

FACULTÉ DES SCIENCES ET DE GÉNIE
UNIVERSITÉ LAVAL
QUÉBEC

Août 2005

Short abstract

Different approaches have investigated the syntax and semantics of agent communication languages. However, these approaches have not indicated how agents should dynamically use communications. Instead of filling this pragmatics gap, most approaches have mainly focused on the 'structure' of dialogues even though developers are more interested in agents' capabilities of having 'useful' automated conversations with respect to their goals rather than in their abilities to structure dialogues. We addressed this problem that requires re-inquiring the four main dimensions of (agent) communication : syntax, structure, semantics and pragmatics (the theory of the use of language).

At the syntactic level, we have developed an agent communication language called DIA-GAL [DIAlogue Game based Agent communication Language] which consists of a set of dialogue games that allows for the grounded manipulation of social commitments. At the structural level, DIAGAL dialogue games offer a good compromise between the lack of flexibility of protocols while taking into account the conventional aspects of dialogue which were missing in isolated speech acts approaches. At the semantics level, we provide a social commitments model that captures the inter-dependencies contracted by the agents toward each other during dialogues.

In that context, our main contribution concerns the cognitive aspects of pragmatics. To this end, we develop in this thesis a motivational theory for the use of such a conventional and social agent communication framework. Our approach is based on cognitive science results that have not been formalized yet. Our theory consists of a formalisation and a unification of the cognitive dissonance theory (one of the major theories of cognitive psychology) with the coherence theory issuing from philosophy of mind. Our approach is formulated in terms of elements and constraints which allow making it computational. This theory allows formally defining and exploiting the notion of utility of dialogues.

We show in this thesis how this approach allows solving many theoretical and practical problems in agent communication. As a validation of this approach, we extend classical BDI [Beliefs, Desires and Intentions] agents to allow them to automatically use DIAGAL dialogue games. The resulting framework provides the necessary theoretical and practical elements for implementing our theory. In doing so, it brings in a general scheme for automatizing agents' communicational behaviour.