On the Logic of Collective Intention

Kepa Korta & Jesus M. Larrazabal

In recent years collective action has become one of the main topics of theoretical interest in such different fields as Distributed Artificial Intelligence, Pragmatics, Philosophy of Mind, Social Psychology, Ethics, and Social and Political Philosophy, with many applications to the design of multiagent systems, models of conversation, models of group interaction, analysis of responsibility in social settings, and to the modeling of social choice. At the basis of the notion of collective action there is a clear idea of intentional action, taking intention as a mental cause of action, which means that actions are explained in terms of satisfaction of intentions (Tuomela 1982), distinguishing from mere motives, which only serve to justify actions. The traditional BDI framework for a singular agent has to be enriched with at least the concepts of mutual belief, collective intention (Searle 1990, Korta and Larrazabal 1998) and the determination of the relationships among them.

It is worth noticing that there is a strong logical tradition of using modalities for representing knowledge, belief and other mental states with a clear 'possible worlds' relational semantics and its corresponding formal systems. In that framework it is clear what we mean by 'to believe p', 'to have p as a goal', 'to intend p'. In the case of collective action we have to take into account a multimodal semantics fixing the properties of mutual belief (Colombetti 1993) and collective intention (Korta 1996), considering at the same time the rationality' conditions (Singh 1991) giving coherence to the whole system.

Concerning mutual belief, we adopt Colombetti's modal operator avoiding the infinitary logic demanded by Schiffer's (1972) and that has a fixpoint semantics, which places it between KD4 and KD45. With respect to collective intention, we introduce it by a KD modal operator with axioms 4 and 5 in relation with belief introspection and axiom 4 in relation with mutual belief (in the last case axiom 5 does not hold). A discussion of further properties relating collective intention with other mental states of the agents involved in collective action will be offered in the present work.

Colombetti, M. (1993), Formal semantics for mutual belief, Artificial Intelligence 62, 341-353.

Korta, K. (1996), Hacia un modelo del diálogo: intención, acción, comunicación. Memoria de tesis doctoral. (Bilinge: euskara / castellano.) Donostia- San Sebastián. UPV-EHU.

Korta, K. & J. M. Larrazabal (1998), Diálogo y Acción Colectiva, Manuscrito 21(l), 107-148.

Schiffer, S. (1972), Meaning. Oxford: Clarendon Press.

Searle, J. (1990), Collective intentions and actions. In P. R. Cohen, J. Morgan and M. E. Pollack, Intentions in Communication. Cambridge, MA: The MIT Press, 1990, pp. 401-415.

Singh, M.P (1991), Intentions, Commitments and Rationality. In Proceedings of the 13th Annual Confrence of the Cognitive Science Society.

Tuomela, R. (1982), Explanation of Action. In G. Floistad (ed.), Contemporary Philosophy. A new survey. Vol. 3, The Hague: Martinus Nijhoff Publishers, 1982, pp. 15-43.

Addresses
Kepa Korta: I.L.C.L.I., The University of the Basque Country, Av. J. Elosegi 275, E-20015 Donostia, Spain
E-mail: ylpkocak@sc.ehu.es

Jesus M. Larrazabal: I.L.C.L.I., The University of the Basque Country, Av. J. Elosegi 275, E-20015 Donostia, Spain
E-mail: y1plaanj@sc.ehu.es