Collective intelligence and social ontology.
Bridging the divide between human and animal collective cognition through stigmergy and peircean semiotics

Through this proposal I wish to underline a few limits of an intentionalist approach to cognitive interaction and social ontology, typical of classic cognitive science and social theory. In particular, I shall try to offer a good alternative to the concept of *collective intentionality* [Searle, 1995; 2010] to account for the socio-cognitive interactions taking place in a group of agents, focusing with particular attention on the concepts of *cooperation* and *competition*.

Now, the concept of collective intentionality entails some preliminary requirements like a conscious subject and the consciousness he has of his actions as part of a wider "project", in which the actions of the other agents he comes in contact with can fit. Their actions take place in a background of shared rules which make it possible to understand the behaviour of the others and to act consequently. So the main problem, in my opinion, is that collective intentionality implies a *previous deal*, sealed by the agents, and a "common project" to which everyone *knows* he is contributing to, as well as a *direct cognitive relation* among the agents and a *conscious construction* of the rules, like it happens in the choreography of a ballet.

Instead, collective intelligence phenomena can be explained by means of structures of emergent rules, "byproduct" of the behaviour of agents who pursue their individual and more limited objectives: it is not necessary to establish in advance all the rules of the game to get the development of cooperation or competition dynamics in a group [Heylighen, 2015a; 2015b]. A stigmergy based approach permits to bypass the difficulty of a conscious planning of rules and the intentionality postulate it entails. This is because the action (*ergon*) mediated by signs (*stigma*) is the mechanism that make the manipulation of information possible through an *indirect* cognitive relation among the agents, mediated by the *space* where they act. So, we can have two different types of stigmergy: the first one, based on a *sematectonic stimulation* [Wilson, 1975], that is the physical modification of the environment which entices a specific behavioural response; or the second one, based on *markers* dropped off in the environment, indicating what to do to the agents which "read" them. Shortly, a sematectonic trace corresponds to what in Peirce's semiotics is and *index*, while a marker corresponds to what he defines as a *symbol* [Heylighen, 2015b]. I shall try to remark how an approach to group cognition can be tackled from a perspective based on stigmergy and peircean semiotics.

Keywords: collective intentionality; group intelligence; stigmergy; Peirce; semiotics.