

Emergence of vocabulary in a society of agents

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Diploma thesis summary

Although there is a lot of information in the fields of linguistics, psychology, anthropology and neurobiology, the origin and evolution of language is still an open question.

One theory says that language is a natural ability and there is a universal grammar. But there is an alternative theory - language is a phenomenon of emergent evolution.

Language is a mass phenomenon defined by interaction between different agents. It is like a flock of birds or ant colony. An individual does not have comprehensive knowledge of language, it does not control any language. Focusing on the process of using and forming a language as a simple and idealistic situation between speaker and hearer causes the overview to be lost. By way of analogy, this is like losing a path in an ant colony when focusing research on one ant.

Language (1) could originate by spontaneous self-forming if physical, psychological and social conditions were fulfilled and (2) will be getting autonomously more complex - based on the same mechanisms causing growing complexity in other areas such as evolution, self-organization etc.

A dynamic system is a system that changes with time. The outcome of a dynamic system results from the interaction between elements of the system and is not centrally defined.

Self-organization is the ability of a system to construct or change its own behaviour or inner organization.

Language as a dynamic system - there are two views. Firstly, a dynamic system is a system that is learning a language.

Secondly, language itself is a dynamic system. Interactions between agents determine the evolution of a language [Steels].

The question is how meanings spread in a society of agents. There are experiments called the "Naming Game" created by Steels. The Naming Game is a formal model to study how meanings and words are associated.

The purpose of my work was to extend the existing model of the Naming Game by "learning by observation" and to extend the presentation of results.

Learning by observation speeds-up the Naming Game. If the cost of observation (receiving signals) is lower than the cost of communication (sending and receiving signals), this is a useful extension of the original algorithm.

An extended presentation brings a more complex view of results. It compares various modifications of the Naming Game. It explains more thoroughly the spreading of meanings and reasons for successful or unsuccessful results of the Naming Game.