

Title:	INSIGHT - DARWINIAN NEURODYNAMICS
Acronym:	INSIGHT
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Partners:

Coordinator:

- ✓ PARMENIDES FOUNDATION – GERMANY

Participants:

- ✓ UNIVERSITY OF SUSSEX – UNITED KINGDOM
- ✓ ECOLE POLYTECHNIQUE FEDERALE DE LAUSANNE – SWITZERLAND
- ✓ UNIVERSITAT POMPEU FABRA – SPAIN
- ✓ QUEEN MARY AND WESTFIELD COLLEGE, UNIVERSITY OF LONDON - UNITED KINGDOM
- ✓ IN SRL – ITALY



Abstract:

Despite eminent and numerous attempts to understand complex thinking, insight problem solving and language acquisition, one is left with the feeling that an essential component of these processes is being overlooked. This project offers and elaborates the Neural Replicator Hypothesis (NRH) stating that this missing ingredient is true Darwinian neurodynamics of replicators within the brain itself. Previous related approaches have been either sketchy, metaphorical, merely philosophical, or have used selection but not replication. INSIGHT is based on, and will refine, plausible neurobiological foundations of neuronal replicators despite the fact that neurons do not reproduce. It will show that Darwinian neurodynamics offers a credible and efficient algorithm for approximate Bayesian inference in the brain.

The project will investigate the NRH in three ways: (1) The hypothesis will be worked out rigorously using formal models and computer simulations, (2) Its empirical relevance will be tested both from the viewpoint of neurophysiology using cell cultures, and from the viewpoint of human psychology using psychological experiments and neuroimaging. (3) Its ICT application potential is tested for two critical domains: robotics and language communication. Robotics work will test whether Darwinian neurodynamic controllers can be constructed that allow robots to engage in open-ended creative autonomous exploration. Language processing research will test whether detailed models of language learning that are based on a replicator dynamics of grammatical constructions is effective for explaining and synthesizing creative linguistic performance.