

**The Evolution of Cooperation  
and Trading (TECT)**



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Few phenomena attract as much attention from as many different scientific disciplines as the study of cooperation. This fascination with cooperation and its cousin, trading, rests on its puzzling nature: cooperation appears fundamentally unstable and theoretically problematic, yet it is omnipresent throughout nature and human societies.

The aim of TECT is to explore new perspectives on ‘the evolution of cooperation and trading’, through empirical, theoretical and modelling research, on a range of organisms, ranging from microorganisms to humans.

The TECT work programme is based on the assumption of an evolutionary continuity of cooperation, both genetic and cultural. This assumption should be made an object of study in its own right. The TECT research agenda therefore draws on recent advances in life, natural, human and social sciences. Across all these areas a number of disciplines have adopted a common theoretical framework for explaining biological and cultural evolution that emphasises the properties of interacting, goal-directed agents, while methodological advances in several disciplines have provided new information about the properties of agents and their interactions. TECT comprises of multinational and multidisciplinary research teams covering anthropology, artificial intelligence research, biology, chemistry, cognitive sciences, economics, history, linguistics, mathematics, neurosciences, philosophy of science, political sciences, psychology, and sociology.

TECT allows researchers to explore the potential for the exchanges of models and theory as well as the transfer of empirical methods and results from one discipline to another. As trading and cooperation are not fully interchangeable concepts, TECT concentrates only on those areas in which the two phenomena overlap.

# List of funded Collaborative Research Projects (CRPs)

## **Cooperation in mutualisms: contracts, markets, space, and dispersal (BIOCONTRACT)**

(CNRS, FCT, FWF, NSF, OTKA)

In biology, a mutualism is an interaction between species that results in increased fitness for both partners. BIOCONTRACT applies contract theory from economics in order to investigate how the evolution of 'natural contracts' can distribute the benefits of mutualism among partners. The CRP draws and expands upon the economic theory of self-enforcing contracts to investigate how mutualisms persist in the face of potential exploitation by cheaters (organisms that reap the benefits of mutualism but do not reciprocate). BIOCONTRACT parameterizes the models that are developed by using data from several empirical systems. In so doing, it aims to describe general mechanisms that promote and maintain cooperation in diverse biological systems.

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## **Cooperation in corvids (COCOR)**

(CNR, CNRS, FWF, MEC, NSF, NWO)

COCOR uses the potential of the corvids to deepen our understanding of cooperation in group-living organisms. In order to tell unique 'historical accidents' apart from fundamental evolutionary principles, one needs extensive information on at least one more taxon that can rival the primates in its rich variation of social organisations, is easily accessible for study and has a proven potential for an experimental approach. COCOR strives to better understand the selective forces that resulted in the evolution of the mechanisms that play a role in cooperation and to unravel those mechanisms themselves at various levels.

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## **Dynamic complexity of cooperation-based self-organising networks in the First Global Age (DynCoopNet)**

(FCT, MEC, NSF)

DynCoopNet ties together the self-organising commercial networks of the First Global Age (1400-1800). The CRP will produce new theoretical insights about cooperation in the context of the dynamic complex system of which these evolving networks were a part. IT will reveal the mechanisms of cooperation that permitted merchants and others to establish and sustain these often long-distance trading networks. The CRP will employ Geographic Information Systems (GIS) as a data integration engine and visualisation tool to bring together layers of information necessary to understand the high levels of cooperation. The CRP will use spatial statistics and mathematical modeling to compensate for incomplete data due to the fragmentary survival of sources and to discern the possible impact of layers of interaction of which there are few surviving traces.

### **Project Leader:**

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## **Sustaining eco-economic norms for a sustainable environment (SENSE)**

(FWF, NSF, NWO)

SENSE combines perspectives from ecological and evolutionary theory, from economics and the theory of games, from the mathematics of dynamical systems to the theory of complex adaptive systems to provide new insights on the achievement of cooperation in addressing problems of the Global Commons. Central to the CRP will be the Tragedy of the Commons, in which individual benefit and group interest are in opposition. SENSE draws heavily on field work on cooperation and leadership in vertebrate groups; experimental work on the role of punishment in sustaining norms; theoretical work in game theory; and the mathematical modeling of the dynamics of complex adaptive systems.

#### **Project Leader:**

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## **The social and mental dynamics of cooperation (SOCCOP)**

(CNR, CNRS, MEC, NSF, OTKA)

SOCCOP will identify and explore, both theoretically and empirically, the fundamental structural, interactional and mental determinants of the evolution of cooperation among unrelated individuals in humans and other species. Our goal is to establish how far the traditional self-interest/reciprocal altruism view of cooperation can be extended and at what critical points are the model of social preferences and other-regarding behaviour required. Different approaches and disciplinary perspectives and different sub-issues will converge on this crucial objective.

### **Project Leader:**

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The aim of the European Collaborative Research (EUROCORES) Scheme is to enable researchers in different European countries to develop collaboration and scientific synergy in areas where European scale and scope are required to reach the critical mass necessary for top class science in a global context.

The scheme provides a flexible framework which allows national basic research funding and performing organisations to join forces to support excellent European research in and across all scientific areas.

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[www.esf.org/eurocores](http://www.esf.org/eurocores)

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\* Organisation financing TECT CRPs



## TECT

The Evolution of Cooperation and Trading

Reciprocal altruism using the swing.  
Courtesy of Ronald Noë

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