

## Objectifs

What made us such a unique species, able to cooperate in large-scale societies, organize social interactions and dominate ecologically the Earth? The main goal of this course is to provide the evolutionary biology foundational concepts to understand the evolution of human cooperation. The course will consist of two two main ingredients: cooperative behavior and decision-making mechanism leading to cumulative cultural evolution. On one side, the course will thus focus on studying the main forces favoring and maintaining cooperation (e.g., mutually beneficial interactions, altruism) and conflict (cheating, malevolence, warfare) in group-structured populations. On the other side, we will study the forces behind decision-making and cultural evolution, where behavior in interactions depends on genetic determinants, social learning, and individual learning ("gene-culture coevolution"). This will allow discussing the major steps in human social organization evolution, from primate autarky to division of labor in large-scale societies.

## Contenus

The course will be composed of five main parts and be more focused on human behavior than the "Genes, populations and evolution" class on which it builds:

**(1) Cooperation and conflict in well-mixed populations.** Here, we will study the evolution of cooperation (and cheating) in well-mixed population (no division into groups). We will study the standard one-shot social dilemmas illustrating the tension between self-interest and group-interest, like the prisoner's dilemma and the stag-hunt game. We will then investigate various settings of repeated interactions, where reputation dynamics between individuals are crucial to sustain long-term relationships.

**(2) Cooperation and conflict in group-structured population.** Here, we will study the forces shaping cooperation when interactions occur in group-structured populations (the rule in humans), and where the localization of the social interactions generates in the same time novel incentives to cooperate and novel incentives for spiteful behavior. We will also consider conflicts between groups and study warfare in small-scale hunter-gather societies.

**(3) Decision-making mechanism and individual learning.** Here, we will discuss the main theories behind the evolution of human decision-making (in particular evolutionary psychology and behavioral ecology), and the main modes of individual learning that allow individuals to learn information about the relevant behavior to express on their own (e.g., trial-and error learning and related decision heuristics, maximizing behavior). We will discuss the conditions under which evolution may and may not lead individuals to become equipped with goal functions ("utility maximization behavior").

**(4) Social learning and gene-culture coevolutionary theory.** Here, we will study the main modes of social learning ("cultural transmission"), which underlies cumulative cultural evolution that is the main determinant of the human lineage ecological success. We will also study gene-culture coevolution and how social learning impacts the dynamics of cooperation within groups.

**(5) Major transition from small to large-scale societies.** Here, we discuss the main evolutionary steps that took the human lineage in a 6 million year long co-evolutionary gene-culture ride from self-reliant primate social organizations ("autarky") to large scale societies with extreme division of labor ("catallaxy").

## Références

### Pré-requis

Ecology and evolution course

### Evaluation

#### 1ère tentative

##### Examen:

Oral 0h15 minutes

##### Documentation:

Autorisée

##### Calculatrice:

Autorisée

##### Evaluation:

Oral exam organized by the faculty of biology and medicine

### Rattrapage

##### Examen:

Oral 0h15 minutes

##### Documentation:

Autorisée

##### Calculatrice:

Autorisée

##### Evaluation:

Oral exam organized by the faculty of biology and medicine