Comparisons of fitness constitute a standard procedure in the biological sciences. For example, we compare the fitness of two cats by looking at the number of offspring they produce. If one produces more offspring than the other, then we might say that it is fitter. However, in many cases comparisons of fitness are extremely problematic. This is seen especially in the case of evolutionary transitions in individuality (ETIs): events that take place when units capable of reproduction group together to form a higher-level unit that is equally capable of reproduction. Such events have occurred many times in many independent lineages. This concept might be exemplified by the evolution of multicellular organisms, such as cats, that came into existence as a result of the grouping of eukaryotic cells. The problem is to understand how the fitness of participants is changed during ETIs in comparison to that of units that do not undergo ETIs. This issue still provokes disagreement and confusion. An interesting question is: what if it is not always possible to understand whether the fitness of a given unit is enhanced or diminished in the course of an ETI? This might happen if it turned out that we cannot really compare the fitness of a unit undergoing an ETI with its free-living counterparts inhabiting its former environment (a comparison that could be made easily prior to an ETI), and thus we cannot conclude whether the ETI enhanced or diminished its fitness.

This concludes the outline of the main research tasks and hypotheses of this grant project. The **first research task** is to conduct a philosophical analysis of the conditions of fitness commensurability. This analysis will provide a theoretical framework that will determine when a comparison of the fitness of two individuals is theoretically justified. The **second research task** is to use this framework to understand whether we can compare the fitness of units which have undergone ETIs with those which have not, and thus whether we can understand how the fitness of a given unit is changed during an ETI.

I will employ two main methods. The first is based on **analysis of a scientific practice** in order to identify the assumptions scientists make when analysing how a given interaction changes the fitness of participants. This analysis will be conducted through a careful examination of the way scientists conduct research, using examples of good and bad studies. This will enable me to identify the conditions necessary for analysing change in fitness, through examining the qualities that make a given piece of research either good or bad. The second method is **conceptual analysis.** I will examine only scientific practice in general, but also the nature of the concepts that scientists use in their practice. I will analyse these concepts in order to clarify their aims and underlying ideas in a given case. This will enable me to understand the nature of scientific practice and, thus, better understand the conditions of fitness commensurability.

The concept of fitness is at the heart of the philosophy of biology, as it is linked with the concept of natural selection and thus has attracted a great deal of philosophical attention. However, there has been little philosophical discussion of the conditions that make fitness comparisons reliable. The project will provide a novel contribution to our knowledge about fitness by providing the first comprehensive philosophical analysis of the conditions of fitness commensurability. This should benefit all philosophers interested in debates on fitness, as the question of what makes a comparison of fitness reliable is a recurrent theme in many debates. Furthermore, as I will prove by analysing evolutionary transitions in individuality, my framework will be useful as well for clarifying certain biological debates. Therefore, the project will contribute to both ‘the philosophy of science’ and ‘philosophy in science’.