Philosophical studies of modal epistemology have focused on the logical-semantic aspect, where there have been important philosophical contributions but at the cost of leaving aside scientific practice. I consider that studies about modality should focus on how science actually works, particularly on how the notions of “necessity” and “possibility” are used to evaluate actual epistemic scenarios. Studying actual practice would help us to understand correctly the inferential process behind the generation of scientific knowledge. For this reason, in this presentation I examine the case of systematic biological species to show how the inference of evolutionary scenarios and the use of Bayesian reasoning illuminate the use and importance of modal notions in actual practice.

Briefly, modal epistemology aims to explain the link between the beliefs of an individual and what constitutes reliable knowledge. To carry out this objective, modal epistemology evaluates beliefs in actual and possible situations to show that the link between truth and belief is more than a lucky coincidence in the real world. The evaluation involves the use of notions of "necessity" and "possibility" whose value lies in being epistemic devices that help us to establish the conditions of possibility of knowledge in general.

Both in everyday life, as in science, the tendency to use a modal reasoning in planning and decision making is present. But given that science generates reliable knowledge about the natural world, modal reasoning is explicitly expressed in the construction of experiments that verify a hypothesis as well as in the exploration of possible explanatory and predictive inferences derived from scientific practices, exemplified, in this presentation, by the field of systematics.

Systematics is a discipline of biology that aims to classify discrete entities of nature in evolutionary units called species. To obtain natural classifications, it evaluates counterfactual evolutionary scenarios, called hypothesis of phylogeny, which have a degree of probability of being true given available evidence. Evaluating evolutionary scenarios involves a kind of modal reasoning that is exemplified by Bayesian inferences which support hypotheses of kinship between species and higher taxa. Bayesian reasoning, being an instance of modal reasoning, allows us to affirm the reliability of phylogenetic hypotheses in obtaining an explanatory and predictive knowledge about the evolution of biological species and the diverse forms of life in nature.

I consider that an approach to scientific practices, plus developments in logic and semantics, will give us a better understanding on how scientific inferences are obtained and how reliable knowledge is generated. Given that studying modal epistemology in the context of scientific practices has been poorly developed in philosophy, my work is a contribution to this field as well as a contribution towards better understanding scientific reasoning.
Grounds and Structures. A Discussion on a Possible Metaphysical Framework
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One of the goals structural realists aim to achieve is providing a metaphysical framework for this view, complementary to the epistemic one Worrall proposed since 1989. In this sense, ontic structural realism (OSR) seems to be a very promising option, committed to the idea that the world has an objective modal structure, which is pictured by the mathematical structure of our best scientific theories. Our modal claims have their truth-value, according to this, independently of our epistemic states. A critique due to Stathis Psillos starts developing from the observation that modality cannot be drawn from the mathematical structure, as if there is such a structure, the claims involved are necessary, by definition. His proposal is to have an account which is abstract enough that it would ensure independence of any physical system, but also instantiated by concrete physical systems, and this would be possible, in his view, if one includes a form of Causal Structuralism on the list. Our proposal is to take into account Kit Fine’s theory on Grounding. Fine advocates that the discussion of what is real, or fundamental, should start from discussing grounds, which are to be considered the form of metaphysical essence, and this observation is useful in approaching Psillos’ proposal. The novelty Fine brought on essentialism is that necessity is no longer the primitive notion, but reducible to essence. A form of expressing essence is, for now, that an object P has a property A in virtue of the class of objects that have that property, and the most important achievement is ontological independence, which seems to be what Psillos is looking for. We explore the benefits and risks of accommodating ground and structural realism, and question about the means this would be possible, taking into account truthmakers and/or hybrid logics.

Antique atomism, modern physics and structural realism
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The article deals with the status of Plato’s version of antique atomism in contemporary science. It has been shown (W. Heisenberg) that mathematical atomism by Plato in many respects anticipated the ideas of atomism of modern physics. The author connects mathematical atomism with the structural realism which is now considered by many philosophers of science as the most defensible form of scientific realism (J. Ladyman). The conception of structural realism has made it possible to undermine the argument of “pessimistic induction” and to bring a significant contribution into rational reconstruction of the process of theory-change. It is supposed in the article that the establishing the connection between structural realism and Plato’s atomism makes it possible to take out the latter from the sphere of natural philosophy and to place it into the frames of rational discussion about the structure of being.