Scientific sketches and scientific understanding:
how to get the advantage of theft over honest toil (and develop partial understanding in the context of collaborative science)

<the talk will be given in French or in English, depending on the audience>

Mots-clé: explication, explanation, compréhension, understanding, incomplétude; incompleteness; esquisses, sketch, science collective; collective science

Short summary (224 words)

Studies in the logic of explanation focus upon conditions that must be satisfied by ideal complete full-blown explanations. For example, while Hempel notes that actual explanations are often incomplete in comparison what his model describes, he characterizes the analysis of incomplete explanations as essentially belonging to pragmatics and does not develop it further.

The purpose of this talk is to analyze further the role of scientific sketches and investigate more deeply how they work and how they can play their scientific role. I first argue that for some aspects of the philosophical study of science, one needs to take incomplete explanations (hereafter sketches) as a central part of the inquiry and I thereby try to account for the presence of incomplete tokens of explanations within science in cases where the complete version is already known by the community (versus cases when incompleteness is due to unfinished research). I further describe how the notion of incomplete explanations should be conceptualized with the aim of understanding how sketches, though incomplete, can still be valuable and play an important, if not indispensable, role in science. I finally propose typical cases of sketches in order to describe in which type of cases incomplete versions of explanations and phenomena can be fruitfully given. In doing this, I shall try to remain non-committal about existing accounts of explanation and understanding.

Long summary (802 words)

Studies in the logic of explanation focus upon conditions that must be satisfied by ideal complete full-blown explanations.The specific properties of the explanation that are actually met in science and that give flesh to explanations (such as their linguistic format, their size, what is left tacit, etc.) are usually seen as not relevant to these studies. These contingent properties are said to be of pragmatic nature. For example, Hempel notes that actual explanations are often incomplete from what his model describes. Indeed, in scientific practice: explanations are often elliptical, enthymematic, use short-cuts, black-boxes, or whose parts are simply missing. Hempel coins notions to describe these actual explanations, which fall short of the logical standards of complete explanations such as the notion of explanatory sketch or elliptic explanation. But these incomplete explanations are primarily seen as preliminary steps in need of elaboration and supplementation; or as provisional stand-in versions for of their ideal and complete explanations. They only have vicarious virtues, borrowed from their ideal counterparts. As a consequence, their investigation is described as essentially belonging to pragmatics and is not developed by Hempel in his philosophical studies of science.

The purpose of this talk is to analyze further the role of scientific sketches and investigate more deeply how they work and how they can play their scientific role. I first argue that for some aspects of the philosophical study of science, one needs to take incomplete explanations (hereafter sketches) as a central part of the inquiry and I thereby try to account for the presence of incomplete tokens of explanations within science in cases where the complete version is already known by the community (versus cases when incompleteness is due to unfinished research). I further describe how the notion of incomplete explanations should be conceptualized with the aim of understanding how sketches, though incomplete, can still be valuable and play an important, if not indispensable, role in science. I finally propose typical cases of sketches in order to describe in which type of cases incomplete versions of explanations and phenomena can be fruitfully given. In doing this, I shall try to remain non-committal about existing accounts of explanation and understanding.

In the context of a science made by isolated individuals, one can be sure that there is always someone who can completely survey the explanations that are produced; explanations are, at least potentially, epistemically accessible. So it is perhaps a satisfactory idealization to reason as if explanations were always complete and individuals could benefit from them. There is however a range of situations in which this idealization is not satisfactory. In computational science, simulations, computational proofs, theorems, etc. can no longer be surveyed by human minds. In truly collaborative science, different experts work together. To collaborate in daily work, they need to have some minimal insights about what other specialists within their group do even if they do not master the corresponding pieces of knowledge. In the technological sciences, complex artefacts such as planes, or nuclear plants are built but nobody understands every part of them. So it is required that individual engineers running these artefacts but also external individual users (people that run a car, the crew running a plane, countries buying nuclear plants…) get some global insight through simplified explanations about how they work. In all these case, the use of explanatory sketches is one way that is used to partly overcome the loss of individual epistemic access to complete explanations.

How should we conceptualize the notion of sketch if it is to describe fruitfully these situations and help understand how sketches replace their original by fulfilling the same functions? One needs for this to analyze how explanatory sketches convey some epistemic benefits at low cost and afford (partial) ignorance without totally disastrous epistemic consequences. For this, one needs to describe how the degree of explanatory beneficialness of incomplete explanations varies with their incompleteness. The suggestion developed in this presentation is to describe the degree of explanatory beneficialness of sketches by describing how much they still offer the opportunity to answer a large part of the questions that their ideal counterpart offer an answer to.

Once this conceptual framework is introduced, one needs to put it at work by showing how it helps understand how explanatory sketches play their role. Thus, I try finally to single out some typical, pure and simple situations in which a sketching procedure is at work and it is possible to see in virtue of which properties sketches, though incomplete items, are still valuable and provide enough to answer some understanding-denoting questions. I focus in particular upon the following notions: explanatory aggregativeness, supervenience in explanations and explanatory modularity. I define these notions precisely, illustrate them, provide cases when they do not apply, and show how when they do, some epistemically beneficial sketches can be produced.