

## The nature and roles of methods accounts in experimental reports

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In my project I pursue two related goals. First, I draw attention to a key yet neglected element of scientific writing about experiments: methods accounts. By “methods accounts” I mean scientists’ accounts of the rules one should apply in experimental practice, the justifications for these rules, the problems one may encounter while applying them, and the extent to which investigators believed they had followed these rules. I contend that methods accounts are an integral part of what Peter Galison has recently called “technologies of argumentation,” the concepts, tools, and procedures needed at a given time to construct an acceptable scientific argument. I characterize methods accounts in experimental reports and examine how they were deployed to support an experimental result. Secondly, I utilize the study of methods accounts to consider if and how historical and philosophical analyses might be brought together to elucidate past scientific episodes.

Methods accounts – information and arguments concerning experimental techniques and procedures – are an important element of experimental reports. But they have not received much attention. A few studies have focused on how scientists’ methodological pronouncements are utilized in public speeches to promote programs such as Newtonianism or Baconianism. Other studies have unearthed scientists’ metaphysical and epistemological stances, such as their position in the realism-antirealism debates. But analyses of scientists’ views about methodological issues such as reliability, reproducibility, robustness and of the development of these views are rare, and existing conceptual tools for such analyses are rather diverse. Methods accounts are difficult to grasp. To uncover them, one needs to scrutinize past scientific writings to expose and reconstruct how scientists present their findings and support their arguments, and how they utilize statements and reflections about methods to confer epistemic force on the results presented. And to get such a conceptual analysis off the ground, one needs a set of analytic tools – time-tested yet sensitive to the historical record.

In my paper, I examine methods accounts in reports of experiments with snake venom. For over 200 years, there was a strong sense of an experimentalist tradition of venom research, and investigators presented their works as contributions to an ongoing endeavor, engaging with and explicitly building on the work of their predecessors. Snake venom research is thus uniquely suitable for the study of the changing nature and role of methods accounts in writings about experiments. My focus is on two methodological tenets: “multiple determinations” and “repetitions with variations”. My analysis exposes an important difference between methodological thought prior to 1900 and today’s epistemology of experimentation. Recent methodological thought highlights the importance of multiple determinations of experimental outcomes through a variety of independent procedures (e.g. Hacking 1983, Wimsatt 1981). Notably, even in the mid-19th century multiple determinations were not an explicit requirement for the validation of experiments in venom research. References to multiple repetitions and repetitions with variations bore the epistemic weight. Given the recent emphasis on the confirmatory power of multiple determinations of empirical evidence, this is surprising and remarkable. The investigation of past methods accounts thus raises an intricate question: when, why, and in what contexts did the concern with “multiple determinations” arise? Because this concern appears so crucial for modern experimental practice, the investigation of its emergence is a key task for the history of methodological thought.

I then draw on the study of methods accounts in snake venom research to discuss the problem of the

relation between history of science and philosophy of science more generally. While I do think that historical reflection has an important role to play for the analysis of science, I have come to find the idea of testing the mutual relevance of history and philosophy of science through concrete cases misleading. In the concluding section, I will explain why.