

Narratives and Implications: An analysis of Dear 1991

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In *Narratives, Anecdotes, and Experiments*, Paul Dear provides us with an investigation into the creation of scientific knowledge in the seventeenth century. Dear provides us with a thesis that the documentation or recording of a scientific experiment is not an afterthought but a key component of the process of experimentation. After exploring key concepts, we realize that Dear's arguments have significance not only for Galilean and Jesuit science but for today's scientific and publishing practices.

The concept of an “experiment” is central to the emergence of experimental philosophy in the seventeenth century. The notion of experimental philosophy and “Baconian fact-gathering”¹ as espoused by Boyle and the Royal Society is often considered to be the basis of modern scientific practice.² In the seventeenth century, early scientists were less concerned with documenting natural facts³ as establishing a line of rhetoric to convince the reader of the author's authority. Galileo's writings on falling bodies, for example, provide no description of the testing apparatus but instead refer to how often Galileo has observed certain phenomena. Although contemporaries referred to this experience as “experimentum”, it does not match the concept of experiment as understood by modern scientists or the early Royal Society.⁴

Dear presents the reader with another key concept related to understanding seventeenth-century science: “performance”. Performance pertains to the actual conducting of the experiment rather than the peer acceptance of the experiment (as reflected by ensuing

1 Dear, 1991. *Narratives, Anecdotes, and Experiments: Turning experience into science in the seventeenth century*. In *The literary structure of scientific argument: Historical studies*. p. 163

2 See Durant, 1961. *The Story of Philosophy* p.118 for further discussion

3 See Dear's *Narratives, Anecdotes, and Experiments* p. 163 for further discussion on Boyle's concept of “matter of fact”

4 *Narratives, Anecdotes, and Experiments* p. 141

critique or citation). To an early scientist conforming to Aristotelian principles, the ‘performance’ of an ‘experiment’ is a process that deduces commonly accepted truths through observance of natural fact and the application of logic.⁵ Indeed, many of Galileo’s ‘experiments’ would now be classified as thought experiments rather than rigorous scientific method to determine ‘matter of fact’.⁶ In Riccioli’s refutations of Galileo’s theories, however, the documentation of method and apparatus begin to take on an important rhetorical role for the establishment of scientific validity.⁷

After the performance of an experiment, the seventeenth century scientist faced the same task as modern scientists: creating an ‘account’ of the experiment. In reading an account of scientific practice it becomes important to understand the context of the era in which the account was created. Dear provides elucidation in the conclusion of *Narratives, Anecdotes, and Experiments*:

The creation of experimental natural philosophy must be understood through the exploitation and deformation by that framework ...of an entire set of cognitive assumptions and expectations appropriate to [the author’s] intended readership... by literary techniques and strategies.⁸

To properly understand an account of an experiment, it is therefore necessary to understand the world view and assumptions prevalent in the time and culture of the author. By writing

5 See *Narratives, Anecdotes, and Experiments* p.140 for further discussion on Galileo and Aristotelian deductive formal structure

6 *Narratives, Anecdotes, and Experiments* p.136

7 *Ibid* p. 153

8 *Ibid* p. 163

about what he has commonly experienced, Galileo assumes that the reader is familiar with the axiomatic deductive reasoning of Aristotelian method.⁹

In the final sentence of the introduction to Dear' *Narratives, Anecdotes, and Experiments* we are presented with his main argument:

...an account of an experiment is an essential part of its performance.¹⁰

The concepts inherent in this sentence have been previously introduced. Essentially, this argument tells us that the process of reporting the results of an experiment are a key component of the experiment. Dear supports this argument by exploring early seventeenth century scientific practice and contrasting it to the practices of Boyle' s early Royal Society of London. Dear contends that the procedural differences are due to the prevalent Aristotelian rhetorical and deductive methods of the early seventeenth century that were pushed aside by 'Baconian fact-gathering'.¹¹ Galileo and the Jesuits, implies Dear, were a product of the environment in which they worked. Their 'facts' and 'meanings' were largely dependent on the common world view. Echoes of this argument are present in both Wittgenstein' s 'language games'¹² and Foucault' s views on the evolution of language and practice.¹³

Although Dear bases his argument on seventeenth century practice, it is still valid and

9 See *Narratives, Anecdotes, and Experiments* p. 142 for further discussion

10 *Narratives, Anecdotes, and Experiments* p. 135

11 See *Narratives, Anecdotes, and Experiments* p. 162 for further discussion

12 See Baker & Hacker, 1983. *Wittgenstein: Meaning and Understanding* for further discussion

13 See Foucault, 1970. *Discipline and punish: The birth of the prison* for further discussion

applicable to today' s context. The granularity of the problem, however, has changed. We are no longer facing fundamental differences in scientific methods such as those posed by Aristotelian deductive reasoning and Baconian fact-gathering. We are, however, in an era of unprecedented knowledge creation with new scientific journals appearing at the rate of four per day.¹⁴ Each of those journals is dedicated to a practice that encompasses a particular world view and logical processes of a particular field or practice. Significant differences in language, terminology, and assumption may exist in seemingly highly related subject fields. The fields of geotechnical engineering and petrochemical development, for example, use very similar equipment and processes. The particular vocabulary of each field is, however, extremely varied.¹⁵

Dear provides us with a warning that in order to understand and interpret documented experiments from a setting we are unfamiliar with, we first must understand the “cognitive assumptions and expectations” of that context. This warning is not new. Bacon himself provides a similar exhortation in the *Novum Organum* with his *Idols of the Tribe*:

...whatever his [sic] mind seizes and dwells upon, is be held in suspicion: and that so much the more care is to taken, in dealing with such questions, to keep the understanding even and clear... The understanding must not be allowed to jump and fly from particulars to remote axioms and of almost the highest generality...¹⁶

Bacon beseeches that we not overgeneralize either our observations or our interpretations.

14 Hacking, 1996. The disunities of the sciences. In *The Disunity of Science: Boundaries Contexts, and Power*.

15 The author spent several months working as a geotechnical engineer on a job site that involved the use of oil drilling equipment. The early stages of the project were marked with severe communication problems between representatives of the two scientific practices.

16 *Novus Organum* i, 58 (as quoted in Durant 1926: *The Story of Philosophy*)

Dear provides the reader with detailed accounts of the importance of rhetoric –instead of rational observation-- in the works of Galileo and the early Jesuits. He attributes this importance to the dominance of Aristotelian method. It is curious, however, that Dear fails to consider the motivation for the research. As a holy order, we can conjecture that the Jesuit' s passion for science stemmed from a need to decipher the majesty of the creator. The Aristotelian view of God, however, is as a *roi fainéant*- an ambivalent force.¹⁷ So why were the Jesuits so infatuated with the Aristotelian method if Aristotle' s views of the creator seemingly contradict those of the Christian faith (the Aquinas quasi-beatification of Aristotle notwithstanding)?

This particular question regarding the impetus for scientific exploration is particularly salient in today' s environment of tenure, publishing contracts, and consulting opportunities. Following Dear' s analysis regarding the “what” and “how” of scientific exploration, it becomes necessary to explore the “why” of scientific exploration. If the Jesuits conducted science to understand God and the Royal Society conducted science to attain the political harmony of Bacon' *The New Atlantis*,¹⁸ why do we currently conduct research? If we are beholden to a particular ideology as the Jesuits were beholden to Aristotelism, how does our ideology (Capitalism? Post-fordism? Neo-conservatism?) effect our research?

In assessing the effects of our current context, it is beneficial to revisit the concepts presented by Dear: experiment, performance, and account. The scientific method of today relies heavily on experiment and hypothesis testing to determine causality. Except for

17 Durant: *The Story of Philosophy* p. 72

18 See discussion of *The New Atlantis* in Durant' *The Story of Philosophy* p. 135

certain fields such as theoretical physics, the notion of “thought experiment” is completely unacceptable.¹⁹ Similarly, the performance of current experiments requires the results to be repeatable. As for Boyle,²⁰ it is the repeatability of the experiment that creates truth rather than common experience. Finally, we must understand the impact of the current ideology on “account”. Much scientific investigation is conducted for the purpose of publishing. It seems that the purpose of government funding for research (as per *The New Atlantis*) is the creation of published articles. Indeed, Dear notes that *Narratives, Anecdotes, and Experiments* was supported by NSF Grant DIR-8821169. The notion of “account” is also applicable when investigating the editorial bias of many reputable journals. A leading social sciences researcher, for example, recently confided to the author that getting published in many leading American journals requires a racial breakdown of the experiment participants regardless of the purpose of the study! Clearly, ideology and context are still a major fixture of the production of scientific knowledge.

Unfortunately, the concepts that Dear provides will not necessarily allow us to decode the implications of ideological bias in research. They do, however, provide us with a framework for identifying when the bias is in play. As with the Jesuits and the early Royal Society, the current cognitive and environmental confounds of the intended audience has a significant role in the creation of today' s science.

Buyer beware.

19 See Hacking, 1992. *The disunities of science* for further discussion.

20 *Narratives, Anecdotes, and Experiments* p. 162