

RESPONSES TO CASSAN, IORIZZO, BELKIND, LYNCH AND FULLER

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I would like to thank the editors for inviting me to initiate this discussion about method in Bacon’s *Novum organum*, but I would like especially to thank the authors of the five response papers. I’m deeply honored that you took the time to take my ideas seriously.

In what follows, I will respond to each of the papers individually. The responses offer a diverse collection of reactions to my paper, from detailed examinations of my claims, to broader historiographical reflections.

Elodie Cassan

Central to Elodie Cassan’s interpretative project is seeking to understand the *Novum organum* as a unified whole: what she is wants is “to provide a systematic and complete account of this book”, an account if it “as a book with a beginning, a middle and an end”. I am very please that she sees my essay as a step in that direction, insofar as I am attempting to connect Bacon’s method with some other aspects of his project, in particular, the matter theory that weaves its way through the final aphorisms of *Novum organum* II¹.

¹ As above in my main essay, references to the *Novum organum* are given in the text by book number followed by aphorism number. The translation used is by Graham Rees, which can be found in Bacon, 1996–, vol. XI, with the Latin original on facing pages.



In focusing on the way in which the method of *Novum organum* II and the exemplary case of the form of heat that it treats has not been properly understood, I try to call attention to the way in which it is connected with his view of the make-up of the world. But while it goes in the right direction, this falls short of the unified reading that Cassan seeks. Bacon seems committed to the project of building a natural philosophy on the basis of observation and experiment, that's to say, natural history. If so, it seems difficult to understand the way in which a natural philosophy to which Bacon seems committed appears to enter into the project from the beginning, something I still find perplexing and unexplained in the literature, including my own essay. Others have noted it, including Graham Rees and William Lynch, but in the end, it is still a puzzle. I have raised one question about the unity of Bacon's program in the *Novum organum*, but I haven't exactly resolved it. And though I touch on the account of motion in *Novum organum* II.48 and show how it is related to the account of method in the example Bacon gives of the form of heat, I don't give any serious account of the extensive list of the "prerogative instances" or the "instances with special powers", that make up the bulk of book II, where we find a great deal of Bacon's natural philosophy. And then there is the problem as to how we link the extended discussion of the infirmities of the mind in *Novum organum* I with the discussions of method in *Novum organum* II.10–20, not to mention the rest of book II. As Cassan emphasizes, there is much work left to do in order to understand how the different themes and discussions of the book are unified into a single whole.

At the end of her contribution, Cassan asks me for a further investigation of Bacon's reconfiguration of metaphysics in his later writings. Metaphysics is a slippery term. In a correspondence sent after writing her comments, Cassan told me that when she asks this question, she means the term in the somewhat imprecise ordinary sense, as the domain of speculative doctrine about questions that go beyond physics. It is her idea that there is a connection between logic and metaphysics in Aristotle, and that Bacon's views represent an interesting – and self-conscious – alternative to that. (I leave it to her to develop that idea in more detail, as I'm sure that she will do in work she is now doing on the *Novum organum*.) But my own interest is in metaphysics as Bacon understood it in *Novum organum* II.9: the study of the forms that are associated with simple natures. In this way, the ultimate goal of Baconian investigation as illustrated in the "heat" example in *Novum organum* II is applied metaphysics, using our understanding of forms to transform bodies, what he calls magic. But Bacon wrote a great deal after he published the *Instauratio magna* and the *Novum organum* in 1620. My own suspicion is that after the publication of the *Novum organum*, Bacon's attention turns away from the metaphysical notion of form, and toward the notion of latent process, the study of how bodies of different kinds are actually formed



in nature, toward the control over nature that we can get from studying the latent processes rather than the forms, what he calls physics, with its applied correlate, mechanics in the Baconian sense. In this way, perhaps we will discover that the method of the *Novum organum* may ultimately give way to a very different way of interrogating nature, a way found in Bacon's later writings, such as the mysterious but rich *Sylva sylvarum*. It may be too strong to say that Bacon completely abandoned the idea that metaphysics and magic are the ultimate goals of inquiry; one still finds the organizing schema of *Novum organum* II.9 reflected explicitly in the *De augmentis scientiarum* (1623) and perhaps less explicitly in the organization of the House of Salomon in the *New Atlantis* (1626)². But as a practical matter, the search for forms seems to drop out of Bacon's scientific practice after the *Novum organum*.

Dolores Iorizzo

In a way, this is exactly the direction toward which Dolores Iorizzo is pointing. My focus was on the example of the form of heat in *Novum organum* II, the only fully worked out example of method in the *Novum organum*. But later in the *Novum organum*, in the prerogative instances, and in the later natural historical writings, the emphasis is less on simple natures and their forms, and more on understanding the processes of nature itself. Iorizzo is right that this is the direction toward which Bacon the active interpreter of nature is going. The method of the opening aphorisms of the *Novum organum*, which leads to the example of the form of heat, is important, and worth studying carefully: it was the main model we had of Bacon's method for so many years, not to mention centuries. And for that reason it is worth discussing, analyzing, and critiquing, as I was attempting to do in my essay. But it is also important to open out into the larger Baconian world of spirit and tangible matter, and the latent processes

² See *De augmentis*, bk. 3, chapt. 5, in [Bacon, 1858–1874, vol. 1, pp. 571–575], trans. in [Bacon, 1640, pp. 167–172]. For the *New Atlantis*, see [Bacon, 1858–1874, vol. 3, pp. 164–165]. The organized list of investigators and interpreters of nature employed in the House of Salomon roughly tracks the stages of the method as suggested in the *Novum organum*, most notably the organization of natural histories into tables, as suggested in *Novum organum* II.11–13. In the House of Salomon this is performed by what Bacon calls the “compilers”, who organize the experiments collected by others “into titles and tables, to give the better light for the drawing of observations and axioms out of them”. At the highest stage there are the “interpreters of nature”, who “raise the former discoveries by experiments into greater observations, axioms, and aphorisms.” This could conceivably be the forms of simple natures, in a metaphysical science and its magical accompaniment. But it might be something somewhat more modest, a general Baconian physics and its accompanying mechanics.



waiting to be explored. These will give us a different way of controlling nature. Iorizzo gestures toward this other strategy for interpreting nature which can also be found in Bacon's writings: "investigating and manipulating the hidden and secret processes of nature, such as distillation, putrefaction, transmutation, maturation, consumption, dessication, percolation, germination, etc." It is no accident, I think, that the references that she gives to these investigations are largely to passages in the *Sylva Sylvarum*. This suggests to me that in the *Sylva*, Bacon has set aside, and perhaps even abandoned the method illustrated in the example of the form of heat in the *Novum organum* for a different project, also announced in the *Novum organum*, but not developed there or illustrated in the way in which the investigation of the forms of simple natures is. In *Novum organum* II.5, Bacon begins by noting that "the prescription or axiom concerning the transformation of bodies is of two kinds". The first kind is through the investigation of the forms of simple natures, as illustrated by the heat example that was the main focus of my contribution. But "the second kind of axiom (which turns on the discovery of latent process) does not proceed by way of simple natures but of concrete bodies as we find them in nature in her ordinary course..." As I noted in my comments on Cassan, my suspicion is that by the *Sylva*, Bacon may have turned away from the investigation of nature through forms and simple natures, and turned toward this second way of transforming bodies, through the investigation of the latent processes by which bodies are transformed in nature.

Though Iorizzo and I are largely in agreement, there is a subtle point of difference worth mentioning. In my response to her text (and above in my response to Cassan), I have assumed that there is a real difference between the project of transforming bodies through the discovery of forms of simple natures, and the project of transforming bodies through the discovery of latent processes, between metaphysics ("the investigation of forms, eternal and immutable"), whose operative part is magic, and physics (the investigation of "the common and ordinary course of nature"), whose operative part is mechanics, in the language of *Novum organum* II.9. In further discussions with Iorizzo on these issues, she stressed that she sees the two different approaches as different faces of what is a unified program for understanding and transforming nature, and that physics (in Bacon's sense) is a stepping stone to metaphysics (in Bacon's sense). On the other hand, I see nowhere in Bacon's texts where he passes from physics to metaphysics, from latent processes to forms³.

³ Here I depart somewhat from the views of [Weeks, 2007] and [Weeks, 2008], for whom the investigation of latent processes, physics and mechanics in Bacon later writings seem to be a preparative for metaphysics and its operative correlate, magic, which remain the ultimate goals of the investigation of nature throughout Bacon's writings in the 1620s. More recently, Weeks's arguments have been rethought and extended in [Rusu, 2017].



But while we may disagree on the relations between these two projects, we are in complete agreement in seeing them both as important to Bacon's larger enterprise.

Ori Belkind

In his comment, Ori Belkind seems to agree that Bacon's matter theory and his method are intimately related. But what he wants to argue is that they are *even more* intimately related than I argue. One thing he means by that is that the method is supposed to go beneath the surface of things and relate the overt observable qualities of things with the hidden level of the unobservable structures and processes in things, what Bacon calls the latent configuration and the latent processes. This is very much worth emphasizing: the form of a simple nature is supposed to tell us something not about the manifest sensible qualities of things, but about the underlying structure of matter that then gives rise to the sensible qualities, the simple natures. As he puts it, "[Bacon] imagines all natural phenomena can be explained with the help of appetites of various strengths... The program then relies on inductive inference to correlate such fundamental appetites with the simple natures observed in bodies". I agree with this completely.

But Belkind goes a step further: he sees the appeal to matter theory as closely integrated with the method as such. Bacon writes that "the work and aim of human power is to generate and superinduce a new nature or new natures on a given body" [*Novum organum* II.1]. This is what the method outlined in *Novum organum* II.10–20 is supposed to help us do; by leading us to the forms of simple natures, it is supposed to give us the means for such transformations. Bacon's matter theory, his account of the latent schematism or latent configuration of bodies contributes further to this project by helping us to understand what is involved in the transformation of bodies: it tells us what such transformations consist in. Bacon's simple natures are properties we can see in bodies. But the forms of those simple natures involve the underlying structures in bodies, "the processes that make present and make absent the sensible natures in bodies", as Belkind puts it. In this way, the matter theory "underlies the method itself, because it helps Bacon conceive of how bodies transform... It is therefore the medium for carrying out the inductive inference". This is a further way in which the matter theory is tightly integrated with the method of the *Novum organum*. Again, I agree with this completely.

Where I have some disagreement with Belkind is in the particular matter theory that he attributes to Bacon. His claim is that this underlying structure, the latent schematism or configuration of matter is fundamentally



corpuscularian. In a number of places, Belkind refers to Bacon's matter theory as his "dynamic form of corpuscularianism". I don't really see the matter theory behind the *Novum organum* as being corpuscularian. Belkind refers to Bacon's early essay in this connection, the "Cogitationes de natura rerum" (ca. 1604), one of a number of texts in which Bacon seems to express a sympathy for corpuscularianism. The question of Bacon and corpuscularianism in general, and his relation to atomism in particular is somewhat complicated, and the general view in the literature seems to be against the corpuscularian reading, at least for the period of the *Novum organum* and beyond⁴. I, for one, tend to side with those who see the matter theory of the 1620s as a rejection of corpuscularianism. But here is not the place to argue the case. Suffice it to say that Belkind has shown further ways in which Bacon's matter theory is deeply intertwined with the method of the *Novum organum*.

William Lynch

With William Lynch's contribution, the discussion moves in a somewhat different direction. Let me begin by clarifying what I was, and wasn't trying to do in my essay, since that seems to be at issue in his response. I was trying to understand the details of the method that Bacon is attempting to articulate in the opening aphorisms of the *Novum organum*, sticking pretty closely to his own description of it. The point I was trying to make is that Bacon's exposition of the method seems to make substantive assumptions about the questions that an investigation of nature is supposed to be addressing, and seems to make substantive assumptions about nature itself. This was directed against certain modern assumptions about what a method is supposed to do, and about what Bacon's method was supposed to do. I was also interested in understanding how these assumptions could be squared with Bacon's own apparent demand that natural philosophy should be based on observation and experiment: "Man, the servant and interpreter of nature, does and understands only as much as he has observed, by fact or mental activity, concerning the order of nature..." [*Novum organum* I.1] If the method is supposed to tell the interpreter of nature how to go from the observation of nature to understanding nature, then how are we to understand the substantive assumptions that Bacon brings to his method? (By the way, while these substantive

⁴ Kargon, 1966, chapt. V outlines some of Bacon's ambivalence to atomism and corpuscularianism in his texts over his career. [Gemelli, 1996; Manzo, 2001; Manzo, 2006] and [Manzo, 2008] are somewhat more sympathetic to that strand of Bacon's thought. The matter theory that is emphasized in [Rees, 1977; Rees, 1996] and [Giglioli, 2010] is quite different.



assumptions bear some relation to the theory-ladenness of observation Lynch mentions, they are also somewhat different: it is method, not observation that is laden with assumptions, and these assumptions include not only theories but questions whose answers we seek.)

Lynch claims that “Garber seems to resist the conclusion that method talk is nothing but a form of self-delusion, what John Schuster calls a “myth”...” Not so. I do think that matters are more complicated than Schuster thinks, though I certainly don’t dismiss his view. My own view is that Bacon is struggling to articulate a new (or renovated) scientific practice, the *Instauratio magna*, working on both the abstract statement of that program, and examples of what it would be when it is put into practice. Furthermore I think that he never entirely succeeds in either part of the program, nor do I think that he succeeds in articulating a coherent method of inquiry that matches his actual practice. I wouldn’t call it exactly a “myth”, but there could well be some self-deception going on. However, none of that is in my paper: there I am just interested in something more modest, the formulation of method that he gives in the *Novum organum*. Nor am I interested in this paper in understanding how Bacon’s ideas were adopted, adapted, and applied in the Royal Society later in the century, though that’s a fascinating question, one about which Lynch has written at some length.

Lynch is right to remark that my account remains incomplete insofar as I have failed to explain how Bacon may have understood his use of substantive assumptions about the make-up of the world. I offer some speculations, and at the end suggest one possible way in which we might understand the eventual support of Bacon’s natural philosophical assumptions in the broad spirit of his inductive method. Lynch comments: “Bacon’s failure to literally enact his method is then rescued by attributing success to the spirit of Bacon’s law, rather than its letter”. That’s not what I was trying to do. The speculation I offer at the end of the paper is not intended to “rescue” Bacon, or even be taken seriously as an interpretation of Bacon: it is a thought that “takes us beyond exegesis and into philosophy proper,” that is, it takes us to a different domain, where the question is no longer understanding Bacon, but understanding how we might think of his method. However, my interest in the essay is more strictly exegetical. This last throw-away remark aside, my intention is not to rescue Bacon but simply to come to terms with what exactly he is proposing, and to discuss what seems to be a possible problem in the method. In the end, I am perfectly willing to admit that the problem may be with us, not with Bacon, and that we simply have misunderstood his project in some fundamental way. Or, we may conclude, that there really is a serious problem that Bacon may not have noticed. I leave that as a question, without resolving it.



Steve Fuller

Steve Fuller is interested less in the details of my reading of Bacon and the method of the *Novum organum*, and more in larger methodological and historiographical issues. Fuller begins with a diatribe against contextualism in intellectual history, the idea that we should read historical texts in their context, embedding them in the language and world views of their authors, interpreting them as products of their times. Fuller contrasts this with his own approach, what he calls a “transcendental approach”. On that approach, “agents are not just addressing their contemporaries, but also whomever might turn out to be the audience for whatever might correspond to what they are saying”. On the contextual approach, which he attributes to me, “Bacon is treated as someone who only talks about what he knows, whereas in the [transcendental approach] he seems more like a prophet whose words are in search of whatever satisfies the truth conditions of what he says”.

Fuller continues with a broad-brush summary of what Bacon looks like when read through his transcendental approach. To put it briefly, among the most important of the forward looking views Bacon advanced, according to Fuller, was taking knowledge out of the individual, where, Fuller argues, Aristotle had put it. Instead, Fuller claims, “Bacon had a very concrete understanding of knowledge as the product of many knowers, ...something external to those who produce it and potentially available to others not involved in its original production”. Fuller relates this to Popper’s “World Three”, a kind of “modernized Platonism”, a world of disembodied thoughts not attached to individual minds.

There is lots more too that Fuller proposes, too much for this brief response. But this is enough to consider for the moment. For Bacon knowledge is indeed, in a sense, disembodied: it is the product of many knowers and the common property of many knowers. The house of Salomon, a collection of what we would now call scientists (a word that did not exist in Bacon’s day) who collectively investigate nature, is a central institution on Bacon’s island of Bensalem in Bacon’s posthumous scientific utopia, the *New Atlantis*. But the Platonic World Three of Sir Karl Popper is probably going too far. Though knowledge is definitely social for Bacon, it is still very much embodied, knowledge which involves the manipulating of nature so as to be able to transform bodies in ways that would make them more useful to us. Connected with the social notion of knowledge, Fuller goes on to present Bacon as opposed to scientific secrecy and as an advocate for an open science. Not so. We should remember that in the *New Atlantis*, Bacon represents the House of Salomon as being very small, and largely closed to the rest of the society around them. They shared with the larger public of Bensalem the bounty that flowed from their control of nature, but they kept the knowledge for



themselves. The members of the House of Salomon “take all an oath of secrecy, for the concealing of those [discoveries] which [they] think fit to keep secret”, including hiding some from the state [Bacon, 1858–1874, vol. III, p. 165].

Fuller makes rather different use of the aphorism of the ant, the spider and the bee than I do when I quote it in my essay [*Novum organum* II.95]. He begins and ends his essay with that quotation in order to illustrate his “transcendental” reading of Bacon and show how it differs from my “contextual” reading. In that aphorism, Bacon contrasts the bee with the ants, the empirics who “only store up and use things”, or the spiders, like the rationalists, who “spin webs from their own entrails”. Bacon’s bee “takes the middle path: it collects its material from the flowers of the field and garden, but its special gift is to convert and digest it”. Fuller notes, quite correctly, that the appeal to bees suggests Bacon’s view of “knowledge as the product of many knowers”. Furthermore, Fuller notes, like the knowledge that is produced in the House of Salomon, “the honey produced by bees benefit humanity more than the bees themselves”. These are arguably forward-looking aspects of Bacon’s thought that can plausibly be read in this text. But Fuller suggests something further still:

It is easy to understand this discussion of insect activities as an extended metaphor, or perhaps allegory, of human affairs. Aesop’s fables provide classical precedent. But equally one might think ahead of Bacon to Bernard Mandeville, Herbert Spencer, E.O. Wilson and today’s evolutionary psychologists. As we get closer to the present, what might have appeared to be a metaphor starts to look somewhat more literal, especially given our greater understanding of the genetic overlap between ourselves and other animals.

This is, presumably, what Fuller means when he says that Bacon “is more like a prophet whose words are in search of whatever satisfies the truth conditions of what he says”.

I do not in any way deny that Bacon was speaking to the future, envisioning a new science in his *Instauratio magna* and a new scientific and technological world in his *New Atlantis*. Bacon had a vision and, no doubt, wanted to convince his readers to put it into action. And some did exactly that; many of the founders of the Royal Society of London explicitly saw themselves as inspired by Bacon. But even so, what’s the point of linking Bacon’s allegory to Mandeville, Spencer, Wilson, and others, not to mention contemporary genetic science? While it may be an interesting curiosity that there are ways of relating this allegory of Bacon’s to E.O. Wilson’s studies of ants or to contemporary genetics, it doesn’t illuminate Bacon’s vision (or our world) by reading these later intellectual perspectives and scientific discoveries that he didn’t and couldn’t have known back into his texts. Reading Bacon in this passage as a prophet of future discoveries is as illuminating as reading his account of the form of



heat in *Novum organum* II.20 as a “prophecy” of the later kinetic-molecular theory of heat, which I argued against in my paper. Old Testament prophets had credibility when they foretold future events because they were thought to speak in the name of God. Bacon makes no such claims.

In the end, as a contextualist I see no problem appreciating Bacon as someone who was forward-looking: there is no contradiction in reading Bacon in the context of his time, and, at the same time, seeing him as looking to the future. Though he looked forward to a future world very different from his own, his vision was conditioned by his own Elizabethan context. One can say the same about Jules Vern and the late nineteenth century, H.G. Wells and Victorian culture, George Orwell and World War II, for example. But what is interesting is not random and lucky correspondences between their forward-looking vision and the later world, but appreciating the way in which their visions of the future were conditioned by the social, political, and intellectual contexts in which they lived. It is interesting what they may have gotten right, but just as interesting are the limitations in their vision, and what they got wrong: the future is always full of surprises. That’s something to think about when we dream about the future.

Again, I would like to thank my responders for the stimulating and thought-provoking reactions to my paper.

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