
Vico's Problem with the Role of Cartesian Epistemology in the Methodology of Science

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Abstract This article reexamines Vico's early critique of Cartesian reasoning and of how the Cartesian method, which comes from epistemology, creates problems for the sciences once embedded into their methodologies and given a foundational role. The focus will be on *De nostri temporis studiorum ratione* (1709), where Vico argues against generalizing the Cartesian method and overemphasizing clarity and distinctness in the search for truth. To this end, Vico's relation to Cartesianism is first carefully contextualized. Then, Vico is presented as a hylomorphist when it how scientific disciplines and their instruments interrelate, something key for understanding why he questions the "instrumentalization" of the Cartesian method in the first place. Afterwards, Vico's account of the impossibility of maximal scientific progress when the Cartesian method is prioritized across the sciences is presented, as probabilistic reasoning and the importance of the imagination and memory take centerstage. Lastly, the article looks at Vico's opposition to the geometrical method's role in physics and his defense of visual thinking in mathematics. The hope throughout is to advance a picture of the early Vico as being not only a neo-Baconian pragmatist, but a hypermodern "meta-Cartesian" thinker concerned with humanity's optimizing its creative potential in order to achieve scientific advances.

Keywords Scientific Methodology · History of Science · Vico · Cartesianism · Geometrical Reasoning · Probabilistic Reasoning

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1 Introduction

In this article, I reexamine Giambattista Vico's critique of an intuitively appealing mode of reasoning which can be viewed as a generalization of the Cartesian method insofar as it vastly widens the extent of its possible application, and this to the point that its systematic deployment in various contexts becomes an issue of direct and practical relevance to any individual who might be undertaking a legitimate truth-seeking inquiry of whatever sort. More specifically, if the Cartesian method's original purpose was but to aid in the resolution of certain foundational problems which primarily concern the philosophical subfield of epistemology, then what the mode of reasoning in question does is transcend this by refashioning the content comporting the Cartesian method's main precepts and assumptions, particularly those which concern how the degree of clarity and distinctness of an idea can determine its status as certain and true, into both universal and indispensable directives for the mind more generally. This, of course, would mean that heeding such mental directives is something that serves to better orient one's thought processes in the direction of whatever truths one might be in search of.

As it is, all this means that a large part of the central task at hand will consist in elucidating the diverse reasons for which Vico vehemently opposed any uniform or systematized prioritization of this generalized form of Cartesianism, whether this was in the context of education and pedagogy or in that which concerns the proper way to practice or carry out truth-seeking disciplines in general. The specific case of scientific inquiries, however, will represent this article's main focus, as much of what Vico has to say touches on these kinds of fields in particular and seems to be especially relevant for the way one should understand them. This emphasis will therefore reduce much of the task at hand to a proper elucidation and reassessment of the many arguments which make up Vico's account of the problems he believed were involved in embedding or interiorizing the Cartesian method into the methodology of the sciences themselves, a highly consequential move which not only represents the other side of the coin to rendering the Cartesian method a key component of any science's foundation, but which also represents precisely what follows when one gives priority to the Cartesian mode of reasoning in question.

In addressing such issues, I will be engaging with Vico's ideas as they are presented in his early 1709 text *De nostri temporis studiorum ratione*, which is better known in English as *On the Study Methods of our Time* (and, hereafter, *DR*). *DR* is a work which, I hope to show, should interest not only Vico specialists, who have long been aware of its importance, but to anyone who might be working on a plethora of different debates which are directly relevant to the philosophy of science, speaking here not only from a historical perspective, but also a contemporary one.

2 Outline

The purpose of this section is merely to provide an outline of the various topics that will be covered in this article so as to give the reader a synoptic view of things.

Contextualizing Sections. The first two sections of the article following this one will be dedicated to contextualizing the early Vico's thought from rather different angles. In the first of these (**Section 3**), the scene will be set historically via a larger discussion of the mysterious genesis of the early Vico's seemingly sudden shift toward what quickly became a strident form of anti-Cartesianism. In the second (**Section 4**), the opening of *DR* is examined in an attempt to bring into sharp relief, from a more strictly philosophical point of view what Vico's intentions might have been in seeking to oppose and condemn the prioritization of Cartesian style thinking in the way he does in therein, and its main takeaway will be the idea that he should be seen at this point in his career to be promoting an aggressively modern agenda which one might even call "meta-Cartesian" in nature.

Exegetical Sections. The five sections that follow the two contextual sections can be said to represent the heart of this article's presentation of Vico's critique, seeing as they consist of a close and direct engagement with the relevant arguments presented in *DR*. In the first of these (**Section 5**), the aim will be to present Vico as a sort of "hylomorphist" when it comes to his understanding of what it is that makes a scientific discipline the particular discipline it is. This will be done in order to understand the entirety of the thrust of Vico's central thesis later better in *DR*, which most technically concerns the problems inherent in the "instrumentalization" of Cartesianism. In the second (**Section 6**), Vico's account of the negative "epistemic" consequences of the illicit transposition of the Cartesian method to other domains will be presented in detail. The third (**Section 7**) will focus on Vico's related "Baconian" counterargument or practical solution to the problem of giving in to Cartesian trends in both educational and research-based, or scientific, contexts. After this, the gears are shifted somewhat in the fourth exegetical section (**Section 8**), which will be dedicated to Vico's account of the epistemological problems involved in assuming that the geometrical method can be applied across disciplines which are not fully *a priori*. In particular, the case of its possible relevance in physics will be subject to an extended discussion. Finally, in the fifth exegetical section (**Section 9**), Vico's critique of René Descartes' algebraic vision of geometry and his preference for methods in mathematics that give more priority to visual thinking and diagrammatic reasoning will be discussed and critically assessed as well.

After this, the closing section (**Section 10**) will serve to tie together a few loose ends and to assess the merits of Vico's argumentation as a whole. The early Vico's peculiar place within the history of ideas and the relevance of his thought to the philosophy of science in particular will also be addressed.

3 On the Genesis and Nature of Vico's Anti-Cartesianism

In 1699, the 31-year-old Vico was appointed Professor of Latin eloquence, or rhetoric, at his hometown's University of Naples, and he held unto this post until 1741. During the first few years of his long tenure, he was known to deliver some annual orations in Latin to the incoming student body. As Timothy Harfield notes, these orations were mainly intended to function "holistically," in the sense that each one was supposed to serve as "a kind of perfect speech in defense of the importance of humanistic education" (2017, p. 44). *DR*, whose content was delivered in 1708 and published in 1709, represents his seventh and last such oration.¹ It is also quite easily his most famous one as well, even if it is by no means popular outside of specialist circles. *DR*, one should note, can also be described as Vico's first "philosophical" work. However, as shall be elaborated upon later, perhaps it is more proper to describe it as a philosophically oriented text rather than straightforwardly categorizing it as a standard philosophical text, seeing as it does come in the form of a general exhortation against certain Cartesian trends in education and research-related circles and often relies on pragmatic considerations to advance his points.

It is rather notable that in the seventh oration an unexpectedly strong anti-Cartesian strain first becomes manifest in Vico's thought. After all, until that point, his thought had shown few, if any, obvious signs of possibly trending in such a direction. This especially seems to hold true if one judges Vico's previous attitude towards Cartesianism through the prism of his rather positive and glowing earlier references to René Descartes' thought as are found scattered throughout his earlier orations. For instance, to give but one example, at one point in Vico's third oration, which was delivered in 1701, Descartes, who is the only modern thinker referenced in an inspired paeon devoted to the grandiose contributions of classical figures such as Democritus, Plato, Aristotle, Virgil, Ovid, and Galen, is clearly shown to be the subject of Vico's intense admiration:

Listen to Descartes, how he has investigated the motion of bodies, the passions of the spirits, and the means of perfecting vision. Find out how he has meditated on the first philosophy and has applied the method

¹ This holds, at least, if one thinks of these orations as making for a series of sorts, since Vico did deliver a few other (rather prominent) orations later on. In 1719, for instance, he delivered one which notably anticipated the longest work of his career, the three-volume treatise *Il diritto universale* (1720-1722), or *Universal Law*, a work whose connections to the *Scienza nuova* are explored by Mirella Vaglia in (Vaglia 1999). Vico himself, it should be noted, summarizes the contents of his 1719 oration in (1944, pp. 156-157). In addition to this, in what is also a sign of Vico's enduring concern for educational matters, his last inaugural oration, the famous 1732 *De mente eroica*, or *On the Heroic Mind*, even revisits and expands upon some of those same pedagogical themes that had already been addressed decades earlier in *DR*. For a fairly recent English version of this work, I would especially refer the reader to Paul J. Archambault's translation, found in (Vico 2004). For a sense of the importance of this last oration, I would also like to refer the reader to the work of Silvia Ruffio Fiore and Thora Bayer, in particular (Ruffio Fiore 1998), (Bayer 2002), and (Bayer 2018).

of geometry to the theories of physics. You will discover that he is a philosopher like no other (1993, p. 81).

Unless, of course, he was somehow being sarcastic, such words do not at all signal any potential future anti-Cartesianism, let alone with a passionate one, which is what Vico went on to develop.

Does any of this mean, however, that an important reversal in Vico's views from something like Cartesianism to anti-Cartesianism had taken place by the time of *DR*? The answer to the question is by no means an obvious one. As Donald Verene has noted, the "standard view" concerning Vico's historical relation to Cartesianism, is whose origin goes at least as far back as to when Benedetto Croce published his landmark monograph *La filosofia di Giambattista Vico*, or *The Philosophy of Giambattista Vico*, in 1922, is that something like this is exactly what happened. In particular, the standard view flatly posits that Vico was in fact a "Cartesian" *simpliciter* before the time of *DR* (2008, p. 81). Verene even recalls his discussion of the matter, the words of the esteemed Vico scholar Max Fisch, who at one point confidently and bombastically claimed that "the greatest critic of Descartes was himself the greatest Cartesian of Italy" (Vico 1944, p. 3). As it is, such a position seems a bit extreme today, and its historical popularity appears to have resulted from scholars simply reading far too much into the supposed implications of Vico's references to Descartes before *DR*.

As Cecilia Miller notes, and Verene's reasoning on the same point is rather similar to hers, there are, on the other hand, some rather good reasons for doubting the truth of the standard view. That is, the idea that Vico ever experienced any abrupt transition from a sort of full-blown Cartesianism to what would later become the unquestionably strong and unadulterated *anti*-Cartesianism that quickly began to inform his work early on (1993, p. 10), and which notably led George de Santillana to refer to him as "the anti-Cartesian manifesto" (1950, p. 566), is very probably an inaccurate one. The main reason to be skeptical about it is, after all, the lack of good textual evidence that has been gathered over the years which might favor the standard view. The paucity is so significant that, as Miller puts it, "[t]he radical break in Vico's thought that many commentators have for so long accepted simply is not to be found in his writings" (1993, p. 10). The thesis that Vico did not undergo this philosophical conversion is further undermined when one also considers, beyond this, the incredibly short amount of time within which everything would have to have played out, at least, if one examines the timeline and order of his orations.

What seems far likelier, by contrast, is that even acknowledging that Vico clearly admired Descartes in some respects at one point early on, that he was still never a Cartesian in any meaningful sense of the term, if at all. If anything, he merely seems to have been someone who, despite probably agreeing with certain Cartesian or pro-Cartesian views, e.g., concerning the idea that some unity existed across the sciences, that he had never focused enough of his attention on the bigger picture philosophical implications that holding on to

such views would imply, at least not until right around the time of *DR*, as this is when he started manifesting his famous opposition to Cartesian-style views. Indeed, perhaps the “Cartesian” idea Vico most strongly holds on to around the time of *DR* is that articulated by Descartes in the opening remarks to his 1637 *Discours de la méthode*, or *Discourse on Method*, where he writes, “it is not enough to have a good mind; the main thing is to apply it well” (1998, p. 1). Vico, after all, probably would have agreed that this was most clearly exemplified in Descartes’ own thought and, perhaps even more so, in that of some of his most prominent disciples.

What is it, however, that would have motivated Vico to become such a passionate and strident anti-Cartesian at a time when such views were so popular in the academic world of his hometown Naples? One anonymous reviewer has interestingly suggested that since *DR* was being conceived at the time of a new Austrian government, that perhaps Vico’s hopes for certain social and fiscal reforms might have had something to do with things. After all, Cartesian-style thinking in the realm of politics used to be associated with a particular top-down approach to carrying out political and administrative tasks, which represents precisely the kind of thing Vico would have opposed. For instance, in *La scienza nuova*, it is popular movements, rather than elitist top-down approaches to politics, which are presented by Vico as the key to any real change. This is not to imply, of course, that his turn to anti-Cartesianism was a political decision, so to speak, but only to suggest that perhaps Vico’s timing in deciding to closely examine the implications and merits of Cartesian-style thinking in general was possibly motivated by related considerations and that perhaps part of his passion in opposing it as stridently as he did is because the issue of analyzing its merits would have had direct political implications.

Aside from this, possible subtexts in *DR*’s title might provide some insight into the matter, and, even if this is too much to assume, a bit of healthy speculation on the matter can still serve to highlight a few initial, yet significant, differences between Vico and Descartes which might lie at the root of Vico’s eventual zeal to undermine pro-Cartesian views. To hypothesize that there is in fact an anti-Cartesian subtext in the title is something that, while technically unprovable, does seem reasonable enough, however. After all, why did Vico end up opting for the idea of *ratio*, as in *ratione*, rather than simply use the more obvious and far less ambiguous Latin term for the idea of a “method,” namely, the one used in the 1644 Latin translation of Descartes’ own *Discours de la méthode* as the *Dissertatio de Methodo*? Of course, one could say that this eyebrow-raising move on Vico’s might simply have been in order to avoid giving the impression that he wanted to carry out some kind of analog to Descartes’ standardly philosophical work, seeing as he would very shortly thereafter be publishing a small metaphysical treatise titled *De antiquissima Italorum sapientia*, or *On the Ancient Wisdom of the Italians*, in 1710.

In any case, it does seem the title of Vico’s work consciously hearkens back to the classic Jesuit set of pedagogical regulations *Ratio atque institutio studiorum Societatis Iesus*, or, as it has come to be known in English, the *Plan and Methodology of Jesuit Education*, which was published over a century

earlier all the way back in 1599. That year was, for the sake of placing things in historical context, only a few years before Descartes himself had joined the prominent French Jesuit college of La Flèche around 1606, a place where, much to his personal chagrin, he would spend the next nine years or so. Commonly known as the *Ratio studiorum*, what the work sought, as a plan of studies, was to expound the rules for teaching theology, philosophy, Greek, and Latin, subjects which were then thought to constitute the bulwark of a comprehensive humanistic education.

Why does any of this matter, one might ask? For starters, it is not unreasonable to think that this seeming nod to the Jesuits on Vico's behalf was meant to serve as a kind of preliminary, if not completely unsubtle, dig at Cartesian ideas, as anyone familiar with, say, how the Jesuit texts on physics of the time dealt with Descartes, might find reasonable. Beyond this, though, the apparent homage to the Jesuit pedagogical classic might also be a clear indicator of Vico's obvious regard for humanistic disciplines, or of his concern for their diminishing relevance, or marginalization, in what was then a time of rapid scientific progress during which Cartesian approaches to education and research were exploding in popularity. This is also worth noting because such a posture would represent a major point of contrast with Descartes' own attitudes on such subjects, at least judging by the account he himself offered of his experience under the supervision of my teachers, I completely abandoned the study of letters" (1998, p. 5).

In the same vein, even if none of the above considerations are representative of the actual facts lying behind Vico's decision to title his text *DR*, this idea of a possible homage to the old *Ratio studiorum* does serve to highlight something else that, on the one hand, unquestionably relates to one of the more consistent markers defining his thought, and which, in turn, serves to strongly juxtapose his views with Descartes' own on the same issue. This has to do, more specifically, with Vico's long-lasting conviction that the wisdom accrued by the great minds or peoples of the past should be valued and that it can still continue to help us understand, illuminate, or guide our thinking in the present and into the future. Vico's enduring and highly appreciative attitude toward the past, particularly when it came to the merits of its intellectual and artistic contributions, is something that, it should be noted, must not be conflated with any reactionary or uncritical reverence for established authority, nor with a simple yearning for the return of a bygone era which comes hand in hand with an antagonism toward modernity and so on.

Vico's attitude toward the past can be said to represent a clear inversion of the more iconoclastic approaches to the past associated with certain modern philosophers such as Descartes himself. Of course, to be fair, Descartes was certainly inspired by older thinkers (and Vico might say, a little *tooinspired* at times). However, at the same time, his texts occasionally betray a kind of superior attitude toward the past that is quite unlike the vibe which Vico's texts give off. For instance, in *Les passions de l'âme* (1649), or *The Passions*

of the *Soul*, to take but one example, Descartes writes that he will address the general topic of the emotions or passions “as if I were considering a topic that no one had dealt with before me,” and this because of the ostensive reality of the fact that the “defects of the sciences we have from the ancients are nowhere more apparent than in their writings on the passions,” even saying their teachings were “so meagre and for the most so implausible” (1985, p. 328), a claim that anyone familiar with the ideas of, say, the Zen masters of the past, certain schools of thought in Indian philosophy, Plato, Aristotle, the Stoics, or the Epicureans might find a bit too dismissive, if not flat-out wrong.

Indeed, in a related vein, Daniel Garber has noted that Descartes was, at one point in time, even considered to be one of the most canonical representatives of a certain class of thinkers known as the *novatores*, who challenged the reigning orthodoxy of Aristotelian natural philosophy in ways that made them stand apart, and not exactly in a good way (2015, p. 3). None of this to say, however, that Descartes was, in fact, a member of this group of thinkers, as he himself made it quite clear he did not want to be thought of as the kind of thinker who valued truth over novelty, as they were once accused of doing (2015, p. 8). Nevertheless, that he was ever labeled this way is probably reflective of something true in his or his followers’ somewhat aloof and glib attitude toward the value of the past’s intellectual accomplishments relative to those of the modern age. This would be an attitude which would not only be hard to reconcile with Vico’s own on the matter, but which he would also likely have repudiated and found indicative of a kind of deep-seated ignorance quite unlike that of the ancient Socrates, who was presumably the wisest in Athens precisely because he was aware of how ignorant he was. Vico might have displayed his disdain for such brashness a bit indirectly when, soon after the publication of *DR*, in *De antiquissima Italorum sapientia*, he points out that Descartes’ *cogito* merely repackages certain ancient ideas of the amateurish kind in a new guise without adding or solving nothing new in the process, as if to indicate that the latter’s ignorance about past thinking hurt him philosophically, in the sense that mistakes could have been avoided had the situation been otherwise (2010, p. 31).

In light of all this, it is possible (though, again, one can only speculate), that Vico’s own deeply erudite and polymathic humanism, one which largely resulted from a professed auto-didacticism, allowed him to see certain important patterns, connections, and gaps between past and present thinking of the sort that would inevitably have engendered a kind of disdain for such brashness or intellectual conceit, or for what he would later refer to in his masterpiece, the *La scienza nuova* (1725, 1730, 1744), or *The New Science*, as the *boria dei dotti*, or conceit of scholars. This seems reasonable enough to hypothesize if one also considers something Elio Gianturco has discussed previously, which is, namely, Descartes’ own well-documented contrary disdain for a certain kind of stuffy learnedness that emphasized philology and other fields of the sort that Vico highly valued (Vico 1990, pp. xxi-ii). We even see some proof of Vico’s disapproval of Descartes’ attitude in this context, when, much later in his *Autobiografia* (1731), or *Autobiography*, he refers negatively to the Descartes

of the *Discours de la méthode* and the *Meditationes de prima philosophia* (1641), or *Meditations on First Philosophy*, as somebody who “disapproves the study of languages, orators, historians, and poets” (1944, p. 137). If one combines all these considerations with the additional observation that such attitudes were also extremely common back then, perhaps it was only natural that Vico eventually became so passionate in his opposition to Cartesianism, or Cartesian-style thinking.

If the above thesis is true, it should help underscore something important about the nature of Vico's potential motives in coming to oppose Cartesian style thinking. More specifically, this would be the idea that Vico's frequent recourse to and emphasis on the enduring importance of the past's contributions should not be seen as coming from any generally reactionary temperament nor from some need to push any dogmatic agenda. However, there are still two other things to consider about the early Vico which some might find to be relevant factors in fully coming to understand his unique journey to anti-Cartesianism. One has to do with certain Platonic tendencies he clearly seems to have had around the time of *DR* which seem to be indirectly connected to a much earlier interest he had in the once trendy thought of Pierre Gassendi, who is known as a prominent critic of Descartes, and the other, presumably less important one, has to do with Vico's potentially inflated sense of patriotism around the time of *DR*.

With regard to the first consideration, there is little doubt that Vico seems to have had some Platonic affinities when it came to issues in the metaphysical and epistemological realms in particular around the time of *DR*. Indeed, as shall be seen later, they even subtly appear in his discussion of the philosophical inappropriateness of connecting physics to the geometrical method in the text of *DR* itself. These are, however, more clearly discernible in the dated language of participation he uses at one point at the beginning of *De antiquissima Italorum sapientia* (2010, p. 17). Why mention this? The purpose is certainly not to advance an image of the early Vico as a Neoplatonist Renaissance-style humanist. Rather, the reason is connected to the observation that these affinities appear to have developed as a possible sort of intellectual paroxysmal reaction or overcorrection in response to what was a Lucretian period earlier on in his career, as evidenced by his 1692 poem *Gli affetti di un disperato*, or *Emotions of a Desperate Man*, which clearly represents his having fallen under the alluring thrall of Lucretius' atomist and materialist philosophy at a certain point in time. In connection with this last point, it is interesting to note that this earlier Lucretian phase was apparently motivated by the younger Vico's keenness to understand the well-known anti-Cartesian philosopher and astronomer Pierre Gassendi's thought, whose thought, at the time, was growing in influence in the city of Naples (Vico 1944, p. 126), meaning he might have had some significant exposure to anti-Cartesian philosophy of a modern kind very early on, before he delivered any of his orations.

It is not easy to determine what exactly to make of all this, however. After all, among the great difficulties with interpreting Vico in general, one that stands out is trying to place him neatly as belonging under any one specific

ideological category or school of thought. Vico simply is, as David L. Marshall has expressed it, “one of those chameleon figures in the history of ideas” (2011, p. 141), for, he is simply “relentlessly eclectic” as a thinker (Vico 2010, p. vii), as Robert Miner claims. The aforementioned reference to Vico’s potentially inflated sense of patriotism, however, is separate from this and does seem to have some role in accounting for the intensity of both Vico’s appreciation for the past and his dislike of Descartes’ prominence in Naples. That there may have been *some* pride-related factors at play in accounting for the Italian Vico’s incredibly deep appreciation for the value of the past, ones that would be connected to the obvious importance of the Roman Empire in the development of Western thought is not particularly shocking. *De antiquissima Italorum sapientia*’s peculiarly patriotic title seems to be proof enough. What is more interesting is seeing how Vico, an obvious champion and promoter of the Latin language, lets this seemingly strong patriotic streak show in a forceful diatribe against the French language of Descartes which is found in *DR* itself. Descartes, one might recall, often wrote in French (besides Latin), at a time when Latin would have been the standard language to use in the kinds of texts he was authoring. In any case, this does seem to betray some hint of Vico’s possessing some degree of an impulse or attitude related to what he would later criticize and refer to, albeit in a different context, as the *boria delle nazioni*, or conceit of nations.

Even if some base impulses ended up slightly exacerbating both Vico’s proclivity in favor of the past and his disdain for Cartesianism, acknowledging that his stances on these issues were not motivated by any discernible adherence to some school of thought nor to specific authority figures of the sort that would make him want to promote some hidden reactionary agenda serves to highlight how the seeds of an idea which Vico only develops much later in his career had already possibly been planted very early on. This is an idea which, most importantly, already appears to inform his inquiry in *DR*, even if only on a subtle level. The idea is, more specifically, that history should not be conceived of as a kind of linear progression of the sort where what is older is built upon and then simply dismissed, as many might assume is the case. Indeed, assuming the genealogy of Vico’s anti-Cartesianism as offered here is correct, it would seem especially reasonable to conclude that the main impulses underlying Vico’s beliefs at this early stage in his career would have been enough to justify his wanting to assess the past’s present value the way he does so in a text like *DR*. It would also explain why he would have had such a critical eye when it came to the value of the dominant trends of his day in spite of all of the obvious progress they had brought about, for instance, in the sciences. After all, if Isaac Newton was right when he said in 1676 that, “[i]f I have seen further it is by standing on ye sholders of Giants” (1959, p. 416), none of that entails that one also has to forget them moving forward, but perhaps, quite the contrary.

4 Vico's Relentlessly Modern "Meta-Cartesian" Agenda

DR, as mentioned earlier, is by no means a standard philosophical text. While difficult to categorize cleanly in terms of its genre, its concerns seem much closer to those a text in pedagogical theory or educational psychology might want to address. Much of its focus, after all, is on learning-related matters, such as what form of learning is most efficient or beneficial to the mental and creative development of students. However, when one considers the exact nature of Vico's central problem, it does become fairly easy to see why *DR* must also inescapably be philosophical as well, or at least philosophically oriented. After all, what it primarily focuses on is in presenting a diagnosis of, as well as a remedy for, the ostensibly pernicious pedagogical effects that would inevitably follow from then relatively unchallenged yet extremely dominant and highly pervasive systematized prioritization of the Cartesian method's precepts throughout all levels of education, including research. Indeed, this simply represented the status quo not only throughout the academic world in Vico's hometown of Naples, but beyond in Europe.

This generalized application of the Cartesian method's precepts, which Vico himself refers to in *DR* as *nova Critica*, or just *Critica*, is one that notably puts an extremely high premium on the value of deductive reasoning and whose guiding precept, one should note here, is that mentally clear and distinct ideas are what constitute the essential criterion for truth. From among the more emblematic expressions of an endorsement of the Cartesian method's value and transposability to domains far removed from epistemological questions, one could hardly do worse than refer to those who used to advocate for the application of the geometrical method to the practice of physics itself. For Vico, such attitudes and assumptions represented a radical shift for the worse and were based on faulty philosophical inferences and in need of being dispensed with. It is no surprise it is the kind of thing he will often find himself arguing directly against in making his larger case at various points throughout *DR*. This, in turn, serves to render a text whose concerns one might describe as being more pragmatically inclined than it is interested in uncovering philosophical truths for their own sake, as still being substantially philosophical in nature or orientation.

The fact that *DR* as a whole is supposed to be a critique of the pedagogical imposition of a specific mode of reasoning that is clearly based on central aspects of Descartes' epistemological thought might, one should add, make it easy to assume that the Frenchman's thought must therefore represent one of the work's obvious targets. This, however, makes for somewhat too facile a claim. Vico's critique, if anything, really seems to be directed against the kind of work that used to be carried out by some of Descartes' most prominent intellectual disciples, at least in terms of its execution, more than it seems to be directed at Descartes' own work, at least generally speaking. As an example, one can point to Antoine Arnauld's hyper-"Cartesian" vision of logic as a representative embodiment of the kind of thing Vico is really wary of.

As such, it is really more accurate to refer to Vico's main target in *DR* as being something like a standardized version of Cartesianism rather than, say, anything like the philosophical theories of the historical Descartes (this would better apply to *De antiquissima Italorum sapientia*). *DR* should not even be seen as endorsing a wholesale rejection of the actual Cartesian method. Of course, the text still is, from a certain angle, a somewhat oblique critique of the Frenchman's philosophy, for there is necessarily some overlap between what Vico critiques about the Cartesian mode of reasoning in question and the beliefs of the individual who inspired it. However, even with this in mind, the fact that the expression of any directed and tangible hostility to Descartes' own thought is so muted throughout *DR* almost renders calling it a sensationalistic truth to claim Descartes is Vico's target. Indeed, it is rather noteworthy that nowhere in the text of *DR* does Vico once mention Descartes by name, and this even when discussing ideas that do seem to be genuinely representative of his thought at times.

The scene is now set for a more direct engagement with Vico's text. To begin, it is useful to go over a few preliminaries concerning *DR*'s general style and structure. As should be expected of a thinker as intellectually eclectic as Vico, the text is, by any account, an interpretive challenge due to the fact that he notoriously possesses, as Giuseppe Mazzotta has put it, a "spiral style of writing and spiral style of thinking" (1999, p. 228). Indeed, Isaiah Berlin, perhaps the best-known expositor of Vico's thought, has gone as far as to deem it "baroque, undisciplined and obscure" (2013, p. 27), while Margaret King has described his prose as being marked by an especially unfortunate combination of "density, allusiveness, and, often, incoherence" (2019, p. 68). Beyond this, *DR* also covers what seems like an endless gamut of topics in what is, relatively speaking, an extremely limited space. One must not forget, after all, that Vico is presenting his ideas in the less-than-ideal format of an academic inaugural oration.

The wide range of topics addressed in *DR* includes, besides the aforementioned rant on the French language, a rather long and winding excursus on jurisprudential themes, which might be predictable as jurisprudence is one of the main subjects within which Vico was trained. Consequently, for the purposes of expositional clarity, this article will necessarily restrict its focus to the more essential lines of argumentation regarding the generalization of the Cartesian method while also zeroing in on those issues which pertain to the philosophy of science (even if various connections can still be said to exist between Vico's critique of Cartesianism and what seem to be the some of the more tangential or unrelated topics he deals with in *DR*). In more concrete terms, the analysis that follows will essentially limit itself to examining the content found in the first five sections of Vico's sixteen-part text.

DR's overall leading question concerns which method of studies is better, namely, that of the ancients or that of the moderns, as Vico flatly asks, "[w]hich study method is finer and better, ours or the Ancients'?" (1990, p. 12). Before one can understand the true nature of his eventual answer and the reason for which Vico offers the specific suggestions that he will end up suggesting as

a result, it is important that, as modern readers, one understand the precise meaning of this question. This will be something that requires, for instance, that one consciously avoid conflating the idea of a “method of studies” with something like what Descartes offers in his *Discours de la méthode*. As Verene notes in a discussion of the rather infelicitous choice of title in Gianturco's otherwise admirable English translation of *DR* as *On the Study Methods of our Time*, “Vico's title has more the sense of the drawing-up of an order of studies according to some criterion than of the presentation of a method of thought in the modern sense of the term,” where method, in this latter sense, usually consists in “how to do something, a procedure, steps or action necessary in order to achieve some desired approach” (Vico 1990, p. xii).

Vico notes that his purpose in trying to determine which method of studies is superior is *not* simply in order to criticize the modern approach, which is a point worth making seeing as it might seem obvious to many, whether then or now, that *any* truly modern approach to education must by definition be vastly superior to an ancient one, at least if one considers such things as the extraordinary rate and nature of the scientific and technological achievements of the modern era relative to those of ancient times (1990, p. 5). Vico's tacitly expressed awareness of the fact that others might possibly have suspected he could have been harboring some anti-modern or anti-science agenda simply in posing *DR*'s leading question is thus important to underscore, then, because it seems to suggest an acute sensitivity on his part toward his audience's possible concerns in this respect, something which, in turn, also serves to indicate his genuine desire to engage in an open-minded and objective inquiry of the sort that should serve to reassure those with nagging doubts as to his real intentions, including any general present-day readers who might still be swayed or somewhat put off by the usual caricature of Vico as an anti-modern and not very pro-science thinker.

Of course, anyone who today might continue to have doubts about the early Vico's views on science as a result of such caricatures, should note these are mostly based on debatable assessments of his later views. They should also be aware that, besides what has already been discussed regarding the likely genesis behind Vico's strident opposition to Cartesian-style thinking, Vico specialists have generally come to acknowledge that *DR* should not be read as a text whose purpose is to undermine or oppose modern science, even if it does question rather fundamental aspects of the modern approach to doing science while also endorsing the adoption of pedagogical strategies which go back millennia. One need not be a specialist to see this, however, as Vico takes many an opportunity in *DR* to enthusiastically extol progress of the sort that any modern thinker clearly values, most notably that of a scientific kind.

For instance, Vico notably opens the text of *DR* with an homage to the Francis Bacon (1990, p. 3), who one can claim arguably represented his biggest singular intellectual influence on matters relating to science,² even if he could

² For more details on Bacon's influence on Vico, the reader should consult Marta Fattori's recent article (Fattori 2020).

not come to share, for reasons that will be explained later, Bacon's well-known scientific hubris, by which I mean what Murray Forsyth has described as his "confidence in the power of man to read God's will in the natural physical world" (1982, p. 39). Even if Vico, then, was not a Baconian in any orthodox sense of the term, it is certainly worth noting that he did side with the views of the pro-Baconian Robert Boyle in his famous dispute with Thomas Hobbes concerning experimentation. Furthermore, it is also interesting to note, as Fisch has observed, that the title of Vico's later *La scienza nuova* also appears to be yet another homage to Bacon, this time to the latter's 1620 *Novum organum scientiarum*, or *New Organon of the Sciences*. This is something which, if true, would certainly serve as a strong testament of Vico's enduring and nearly lifelong admiration for someone who happens to be one of most prominent champions of modern science.

Beyond this, though, Fisch has even suggested the possibility that perhaps *La scienza nuova's* title takes more inspiration from Galileo Galilei's 1638 *Due nuove scienze* (1944, p. 20), or *Two New Sciences*. This hypothesis seems reasonable enough, for Vico also shared a great and enduring admiration for his countryman's groundbreaking scientific achievements, as seen in *De antiquissima Italorum sapientia* (2010, pp. 122-123), which, again, was published around the same time as *DR*. Considering all this, if one also takes into account the rather separate but still noteworthy fact that Vico also sent a copy of *La scienza nuova* to Isaac Newton himself, it seems more than fair to surmise that Vico not only would have favored, rather than opposed, modern science at the time of *DR*, but also that he steadfastly held on to this stance much later into his career. Consequently, instead of at all reading Vico as attacking modern approaches to science in general, many of his critical points in *DR* should really be seen instead as promoting or serving as a vindication of alternative, non-Cartesian approaches to science, specifically experimentalist and less aprioristic ones which were just as modern as Cartesian ones. Indeed, as further confirmation that this is what he really wants to do in *DR*, it is worth noting that in his nearly contemporaneous text *De antiquissima Italorum sapientia*, Vico even goes as far as to describe metaphysics as the "the handmaid to experimental physics" (2010, p. 135), something which should certainly give one some idea of just how highly he valued alternative modern approaches to physics, as well as science more generally at this point in his career.

As such, Miner is, in my view, entirely correct in claiming that *DR* should not be seen as "a crude antimodern polemic" (2002, p. 3). At the same time, I do not exactly share his stated view that it is also only meant to be a "balance sheet designed to compare the advantages and disadvantages of modern method with those of antiquity," (*Ibid.*) even if Vico's words might give this impression, as when he claims, "my purpose is not to criticize the drawbacks of the study methods of our age or those afforded by antiquity, but rather to compare the advantages afforded by the study methods of the two epochs" (1990, p. 5). Indeed, it seems to me that, for reasons that will only be made clearer later, what Vico actually wants to accomplish with *DR* is something else, namely, to help *push* the modern agenda forward by presenting a blueprint that involves

deep-seated educational and academic reform, and this so as to help humanity flourish as much as it can. That this can only take place with the grand and initially counterintuitive caveat that such reform will necessarily involve re-adopting educational and academic approaches rooted in the pre-modern past and its method of studies might, of course, still seem to disqualify him in the eyes of some from possibly being a true champion of modernity. However, to assume such a position would be unfair, seeing as it is rather obvious that many complex processes and projects often require that certain backward steps be taken at certain points in order to keep things moving in the right direction in the most efficient of ways.

As a result, whether or not one agrees with a scholar like Mark Lilla when he labels Vico an “Anti-Modern” (Lilla 1994), with Berlin when he says Vico represents the “Counter-Enlightenment” (Berlin 2013), or with Eric Voegelin when he says that “Vico reacted against Progress and Reason at the beginning of the eighteenth century” (1999, p. 156), views which represent either questionable or highly-debatable assessments of Vico’s thought and legacy, it seems fair to say that even if such claims mainly apply or refer to certain aspects of Vico’s mature thought, for instance, as expressed in *La scienza nuova*, the Vico of *DR* should be seen as the complete opposite of that. This is because Vico wants with *DR* seems to be to help usher in a different, new configuration and idea of modernity in a modern age that he viewed as unjustifiably, and perhaps dogmatically, infatuated with Cartesian-style thought. Because of this, Vico’s understanding of modernity can thus be seen as more modern than the usual conception, seeing as he puts into question, almost in the manner of a Cartesian radical, something which seemed so obvious to many in the academic milieu of this time. More specifically, I am referring to the ostensibly positive value of implementing Cartesian-style approaches both in the context of one’s studies and in the context of the practice of truth-seeking disciplines in general, especially relative to opting for ancient and presumably outmoded approaches to the same. As a result, Vico should perhaps be most accurately described, if anything, as an aggressively modern thinker of a “meta-Cartesian” kind.

5 The Role of Instruments in Vico’s Hylomorphic Account of Scientific Disciplines

Vico follows up the discussion of his aims in *Section I* by making note of a curious distinction between new arts, sciences, and inventions, which he collectively juxtaposes to the separate idea of a method of studies in general, which itself is made up of new instruments and aids to knowledge (1990, 6). A method of studies, for Vico, merely consists in “instruments, complementary aids, and the aim envisaged” (*Ibid.*), and it is Cartesian “critique,” or *nova Critica* (*Critica* for short), that, in his view, serves as the “common instrument” of all the sciences and arts (*Ibid.*). Vico, as mentioned early, never refers to Descartes in *DR*. He also never mentions Cartesianism itself by name either, however, which might make some wonder how one can be so sure that what

he is talking about has something to do with *Critica*. For reasons that will be detailed below, that the aforementioned Cartesian mode of reasoning is what he has in mind when referring to the notion of *Critica* will be shown to be rather obvious, however.

The Cartesian approach to knowledge was, as has been well-documented, ubiquitous in the Naples of Vico's time, having first started, as one study by Henry Perkinson usefully explains, in the field of medicine, and which later began enveloping Neapolitan academic thought as a whole, including fields such as educational theory, which clearly represents one of Vico's concerns at this particular point in his career (1962, p. 31). It even manifested itself in fields like moral philosophy and theology. More specifically, as Nicola Badaloni and Mario Fusco write, the "Cartesian renewal in Naples at the end of the eighteenth century appeared in the form a (stoicizing and Jansenist) rigorism when it came to moral philosophy and in the form of an Augustinianism in theology" (1968, p. 298, my translation), and one can think of the ideas of figures like Nicolas Malebranche as pioneers in this regard. The pernicious implications of the influence of Cartesianism over all these kinds of disciplines are discussed in some way or other in Vico's text, and partly accounts for the wide variety of topics and seeming digressions that constitute the other, later sections of the text which will not be dealt with here.

It should be noted that the idea of an instrument, for Vico, is one that is broadly construed and in need of closer examination. Specifically, this is because Vico somewhat obscurely sees an instrument as that which precedes our being able to learn something, where this not meant in a sequential sense, but in the sense that an instrument is supposed to be what furnishes a given discipline with its characteristic sense of order, or structure, so to speak. As Vico states things, they "presuppose and include a systematic, orderly manner of proceeding" which is why "the apprentice who, after suitable training, undertakes the task of mastering a certain art or science, should approach it in an appropriate well-ordered fashion" (1990, p. 6). The reason that there can be no learning without instruments for Vico is that the collective epistemic byproduct that results from the particular use of certain combinations of instruments in such-and-such a way is precisely that which constitutes or makes up the given discipline or field of learning one is interested in, as learning concerns itself with bodies of knowledge, parts of which obviously must be known beforehand for the eventual practice and progress of such disciplines moving forward. More will be said about this later on, but a misleadingly simple preliminary example of an instrument here would be the telescopes that modern astronomy relies on. For now, then, it seems that Vico appears, at first view, to be endorsing some kind of functionalism regarding what constitutes that which will later become a field of learning proper.

Supplementary aids, by contrast, are of less importance than instruments, as they only serve the role of allowing the former to achieve their intended purpose. As Vico puts it: "instruments are antecedent to the task of learning; complementary aids and procedures are concomitant with that task" (*Ibid.*). Vico also seems to mean this in the widest sense possible, for under this second

category, what Vico has in mind includes any number of things ranging from typographical characters themselves to universities. This makes it a notion so vague, that it almost appears as if Vico does not seem to care to discuss these more external aspects of learning at all, or at least certainly not as much as the way the relevant subject matters they aid are structured or determined. As such, this category will not be of concern for us going forward.

Lastly, there are the ends (*finis*) of a discipline, which essentially represent what justifies the field's existence, in terms of its final cause, which guides them along the entire trajectory of their progressive development. Of these, Vico again does not say much either, other than that truth serves as a common end, which, again, is quite nebulous a claim. As a whole, then, it seems that all three of the initial categories are quite general in nature, but these last two are especially so. As a result, the focus here will unsurprisingly lie on Vico's more crucial and ambiguous conception of an instrument, for this is where *Critica* falls under, after all, seeing as it supposedly serves as a common instrument for the various sciences (and even what we could today consider non-scientific, or humanistic fields).

For the purposes of our discussion, it especially behooves one, then, to try and figure out more regarding the precise nature of Vico's so-called "instruments," particularly in reference to the sciences. In attempting to better understand what Vico means with the rather unhelpful initial explanation he offered of what instruments are supposed to be in terms of what they do, perhaps things can start to make more sense if, rather than interpreting him to be merely assuming some kind of functionalist conception of instruments which only views them through the prism of their use then serves to generate some body of knowledge, one sees him instead as advancing a kind of "hylomorphic" conception of disciplines. That is, perhaps Vico sees each discipline as having its own "stuff" and "structure," and more properly conceives of an instrument as something that serves the role of a formal cause for them. If one takes this to be what Vico has in mind, it means instruments would end up playing an essential rather than a merely "instrumental" role, so to speak, in determining a given science's particular identity or uniqueness relative to other ones. This interpretation of things would seem to have the advantage of better letting one appreciate why Vico thinks the Cartesian approach to knowledge and truth is itself an instrument just as much as, say, a microscope or telescope are.

Indeed, the more clarity one has in this respect the better, especially considering the situation immediately starts to get a bit complicated when Vico starts giving specific examples of instruments from different disciplines, specifically, the ones gathered and displayed in **Table 1** below:

Table 1 The scientific disciplines together with their instruments (Vico 1990: pp. 6-8).

Scientific Disciplines and their Instruments	
Scientific Discipline	Instrument
Geometry	Analysis [as in <i>analytic</i> geometry, which we can contrast with the synthetic geometry of the ancients] + <i>Critica</i>
Physics	Geometry + the geometrical method + (possibly) the new mechanics + <i>Critica</i>
Medicine	Chemistry [from which we got <i>spargirica</i> (pharmacology)] + <i>Critica</i>
Anatomy	Microscope + <i>Critica</i>
Astronomy	Telescope + <i>Critica</i>
Geography	<i>Polaris lapidis urna</i> [that is, something like our modern-day compass] + <i>Critica</i>

There is much that is peculiar in **Table 1**. For one, it seems that a science can itself be an “instrument” in the same way that something like a microscope is. This is seen in Vico’s reference to “chemistry” as an instrument of medicine. Another problem is that it seems somewhat unclear whether Vico means that in the field of anatomy, for instance, the *only* instruments are the microscope in conjunction with that of *Critica* (just two separate instruments), or whether the microscope is also somehow supposed to be understood as secondary to *Critica* despite their shared categorization. That is, perhaps the use of the microscope is such that Vico would see it as that which allows its more abstract counterpart of *Critica* to become an instrument for anatomy in the first place.

If so, this would render the former a sort of transcendental condition for the possibility of the discipline of anatomy as practiced in Vico’s time to emerge, something *Critica* would not equally be able to lay claim to, for, in being anatomy’s only material instrument, it is really the microscope that would individuate and differentiate it from other activities, which either use a microscope alongside other material instruments, or use no microscopes at all. This would then make the microscope a kind of efficient rather than a formal cause behind the generation of the body of knowledge that is called “anatomy,” thereby interestingly giving *Critica* the more foundational role of shaping the very methodology of the science itself. It is some dynamic like this that Vico seems to have in mind in referring to *Critica* as an instrument that is somehow common to all sciences. However, if this interpretation is the right one, it is not made clear enough by Vico’s own presentation of things, for, when he mentions what is displayed in **Table 1**, all is presented as if it was self-evident when this is clearly not the case.

If one temporarily restricts the present discussion to the natural sciences, one might quickly begin to wonder whether if, in Vico’s claiming that certain scientific fields can serve as *the* instrument of other ones, he might merely be describing how things are done, or whether he also wants to implicitly endorse some kind of view akin to that of the scientific reductionists who believe that biology depends on chemistry, which in depends on physics. If so, then Vico would appear to be endorsing the existence of some unity among select sciences

in a way that would curiously not be too distant from Descartes' own views on the matter. After all, the latter's method of procedure could be said to represent a unified scientific method, and that is one fundamental reason for which the Cartesian approach can be said to differ from ancient and more Aristotelian understandings of scientific continuity. Unfortunately, it is not perfectly clear where Vico stands on this point at the time of *DR*, and an answer would have been of obvious interest for the purpose of assessing how far he actually stands from Descartes at this point in his career.

Due to such inconclusiveness, it seems fair to conclude that Vico's seemingly all-inclusive and umbrella sense of *instrument*, which is equated not only with what we would today call an instrument, but also with particular fields, as well as with more generic *modus operandi* or methodologies, like *Critica*, ends up raising far more questions than it answers. Perhaps this is because Vico did not find any clarity on such issues to be essential to his overall argument, considering his audience and so on. Another possibility is that perhaps the open-endedness in his categories was intentional so as to let him create some subtle entryway of sorts to attack the Cartesian mode of reasoning without having to attack the Cartesian method *per se*, for its instrumentalization and generalization in the contexts of education and research is what he is primarily arguing against in *DR*. It certainly seems possible that this ambiguity could have been intentional from another angle too, as perhaps Vico wanted to take an opportunity to silently endorse his agreement with something like a Cartesian view of scientific unity, without, at the same time, wanting to be associated with the Cartesian understanding of things in the process.

6 The Epistemic Consequences of the Cartesian Method's Instrumentalization

Seeing as the philosophical basis underlying Vico's taxonomy of disciplines in terms of their instruments seems to have been grounded in a desire to stress the essential constitutive role that *Critica* has in accounting for the bulk of any science's specific methodology once it becomes prioritized, it behooves one to begin examining the meaning of *Critica* in more detail. Firstly, that it is a reference to the Cartesian method is something that is beyond all doubt (this has been assumed all along thus far, but technically requires some elaboration). This is clearly seen, for instance, in the way Vico sarcastically opens the second part of *DR* by saying that *Critica* "supplies us with a fundamental verity of which we can be certain even when assailed by doubt" noting how it could even "rout the skepticism even of the New Academy" (1990, p. 9). This, of course, can only be a reference to Descartes' *cogito*, and to how it was supposed to overcome the problem of skepticism as articulated by Academic skeptics such as Arcelisaus and Carneades, who held that knowledge of things was impossible, which represented an even stronger claim than that associated with the Pyrrhonist school of skepticism.

It is fair to describe Vico's tone in the above citation as one of sarcasm in part because of the way the *cogito* argument is so vigorously attacked very shortly thereafter in *De antiquissima Italorum sapientia*. What is most interesting to take from Vico's words in *DR*, however, is not so much their tone, or even that they serve to confirm some form Cartesianism as being his target in *DR*. Rather, it is the carefulness of his wording, which seems to demonstrate that he clearly had a rather sophisticated understanding of the centrality of the inner experience of the *cogito* as being that which underlies the entire logic of self-evidence and which gives the Cartesian method its legitimacy and value, which, in turn, would justify the subsequent need for *Critica*. This is because he seems to grasp that what our minds assess as the clarity and distinctness of ideas is grounded in nothing other than the subject, or the subjective realm, just like the *cogito* ultimately constitutes the criterion for what is objectively true about reality. Consequently, even if all Vico technically seeks is to critique the intrusion and one-size-fits-all application of *Critica* into the modern method of studies and its being embedded it within the methodology of the various sciences and so on, he is, also, by virtue of *Critica*'s undeniable epistemological basis and justification, also putting into question the Cartesian conception of the true itself, and *a fortiori*, yet indirectly, the Cartesian conception of science proper, whose ostensive truth was so often taken for granted in his day.

Critica, as the common denominator instrument of all sciences, naturally involves a certain order that must be followed in the quest to attain that truth it seeks, and which constitutes the aim of all scientific inquiries. Vico opens the third section of *DR* by noting how it is the first thing one is trained to learn and that its purpose is "to cleanse its fundamental truths not only of all falsity, but also of the mere suspicion of error," which thus ends up placing "upon the same plane of falsity not only false thinking," but, also, highly probable truths, commanding us "to clear our minds of them" (1990, p. 13). This, of course, sounds a bit like a fanatical form of Cartesian reasoning. However, it does in fact greatly overlap with some of the key ideas expressed in Descartes' *Discours de la Méthode* as well as in the directives found in his brief *Regulae ad directionem ingenii*, or *Rules for the Direction of the Mind*, a work authored around 1628, and first published in Latin in 1701, some fifteen years after its original publication as a Dutch translation. For instance, one sees the endorsement of an unambiguously all-or-nothing attitude concerning the relation between the true and the false when Descartes discusses his pre-*cogito* assessment of philosophy in passages like this one: "considering how many opinions there can be about the very same matter that are held by learned people without there even being the possibility of more than one opinion being true, I deemed everything that was merely probable to be well-nigh false" (1998, p. 5).

Now, if the grounds of self-evidence for Descartes, as noted, are the clear and distinct ideas which serve as the criterion for truth, the way *Critica* operates in general is precisely by reducing a problem or argument to a set of simples or elementary building blocks that happen to be endowed with such properties. This process is called analysis, and it opens the door for later being able

to compose such ideas together with other ones just like them, something which will progressively allow one to reach higher levels of complexity and interestingness in one's quest for truth, and this upward movement, if one can call it that, is called synthesis. Vico's main issue with such approaches and strategies is that in relegating any kind of cognition whose epistemic warrant falls below the threshold of absolute certainty to the status of a falsehood, or at least a non-truth unworthy of dealing with, for instance, merely likely, or highly probable, truths [*verisimilia*], *Critica* necessarily undermines the possibility of cultivating probabilistic reasoning skills of any sort.

Vico, however, considers likely truths to be worth seeking out in and of themselves, seeing them as an important kind of middle term between truths and falsehoods, one that *Critica*'s rigid bivalence simply can in no way accommodate for. As highly probable, *verisimilia* should, though, be seen as being worth more than nothing, for they stand "midway between truth and falsity, since things which are most of the time true, are only very seldom false" (1990, p. 13). This, in turn, partly explains why Vico argues in *DR* in favor of the cultivation of what he calls a *sensus communis*, for possessing this, in his view, is something he believes can help individuals acquaint themselves with *verisimilia* to improve one's chances of coming up with even better ideas than one would in their absence. The idea of a *sensus communis* itself, which meaning is explained below, also represents yet another thing that Cartesianism, particularly the generalized form of Cartesianism Vico finds so especially problematic, puts on the backburner, and severely undervalues in the process.

The idea of a *sensus communis* is not an especially easy one to grasp, yet it is important to have some working definition of not only to distinguish it from what it might rather obviously be confused with, but because understanding it is critical to Vico's overall argument. Indeed, as Hans-Georg Gadamer remarks at the beginning of *Wahrheit und Methode (Truth and Method)*, for Vico, it is ultimately going to be "training in the *sensus communis*, which is not nourished on the true but on the probable, the verisimilar," that represents the "the most important thing in education" (2004, pp. 18-19). What is it, then, that is meant by *sensus communis*? In my view, its meaning has already been well-described in a most general sense by Amos Funkenstein, who notably equated it with the idea of a "collective imagination" (2018, p. 287), though, as one anonymous reviewer has usefully noted, the idea of "communal sense" might do the trick as well (while offering a couple of different advantages of its own).³ In any case,

³ Not only does this clearly represent a more cognate rendering of things, it also better connects to how Vico later conceives of the notion of a *senso comune*, which is itself importantly connected to the notion of a *sensus communis* as presented in *DR*, and not only because it happens to serve as a literal Italian translation thereof. After all, as the reviewer usefully recalls, Andrea Battistini had long ago identified this later notion as being based specifically on ideas Vico had put forward in *DR* (Vico 1990b, p. 1521), which, of course, also makes it rather natural to view the idea of a *sensus communis* as representing a sort of progenitor notion to his *senso comune*. If so, this implies that one should similarly avoid equating the meaning of Vico's *senso comune* with anything like Descartes' *bon sens* or Locke's notion of *common sense*. Indeed, Vico's notion of a *senso comune* is even straightforwardly defined by him in the twelfth axiom of *La scienza nuova*, where it is

an understanding of things along either of these lines is far better one than any association of *sensus communis* with our own idea of “common sense,” which would evidently represent its literal translation into English.

One reason to prefer something like Funkenstein’s definition or something like “communal sense” is that it is important to describe its meaning in a way that ensures it can also be distinguished from the contemporary, everyday notion one has of common sense. The reason this is important is that, for starters, the latter is probably best described as a kind of natural ability to exercise practical judgment. This is something difficult to square with what Vico seems to be going for, which assumes its cultivation is critical to its emergence. Our notion of common sense, by contrast, is taken to be something everyone just shares in a more or less equal degree, regardless of one’s background, culture, education, and so on. Curiously, or perhaps unsurprisingly, in John Schaeffer’s view it is, in fact, Descartes himself who represents “the source of the most common meaning of common sense today. . . [as]. . . practical judgment” (1990, p. 2), and, if this is accurate, it would seem rather odd for Vico to have had any such thing in mind in referring to the clearly much older notion of a *sensus communis* he has in mind. Of course, the idea of practical judgment and Vico’s notion of *sensus communis* must still be strongly related on some level, especially as it seems that good practical judgment would lead to a better sense of what is likely and what is unlikely. However, to assume that Vico wants to emphasize this dimension or aspect of *sensus communis* would grant his claims far less wiggle room to assume that there is also some strong relation between the method of studies one has been exposed to and one’s subsequent openness or ability to engage in probabilistic reasoning going forward.

On the other hand, an alternative definition like “collective imagination” or “communal sense” better captures what I think are the more implicitly conditioned, contingent, localized, contextual, and psychosocial characteristics Vico wants to underscore about the notion of a *sensus communis*. It is the kind of definition that also serves to take one’s attention away from whatever abstract and universal, or even “fixed,” aspects or connotations it might, in fact, have, and these would be the ones that overlap with whatever it is one refers to with the idea of someone having common sense. The assumption of a more historicized sense of *sensus communis* representing what Vico means to emphasize in his discussions about it in *DR* is one that also finds further

equated with “judgment without reflection, shared by an entire class, an entire people, an entire nation, or the whole human race” (1948, p. 57). As for what the connection is between any of this and the idea of defining Vico’s *sensus communis* with “communal sense,” it will be useful to first recall the idea of a commune in general, as this has long represented the basic political and administrative unit in Vico’s Italy, and which one can think of as equivalent to a township or municipality. Keeping this in mind, the idea of “communal sense” seems especially apt as because, for one, it helps detach the idea of a *sensus communis* from any assumptions as to its possible universality, or from seeing its possession as being a sort of given, so to speak. Secondly, it also helps connect the idea of a *sensus communis* to the sphere of the civic in general, which is also relevant because, immediately after defining his idea of a *senso comune*, Vico notably writes that “[t]his axiom, together with the following definition, will provide a new art of criticism concerning the founders of nations” (*Ibid.*).

vindication in his later work, which some might think adds some credibility to the possibility that this is the case. Be that as it may, what is important for now that Vico is conceiving of *sensus communis* here as something that must be highly malleable, determinable by circumstance, and that involves the faculty of the imagination.

In comprehending *sensus communis* in this way, it becomes clearer to see that the reason Vico values its proper cultivation will have nothing to do, at least in this context, with how it can be said to relate to *prudentia*, which is perhaps best translated as a practical, as opposed to theoretical, kind of wisdom, that is, the sort derived from experience in the sense that it is incomprehensible to possess it truly without having first lived a certain kind of life and reflected on one's experiences in a certain kind of way. It is also important to view *sensus communis* in the way described above for understanding that which Vico takes to be its precise relation to the notion of eloquence, for, in his view, it serves as its guiding standard, and its state reflects one's ability to make use of memory and the imagination. Unsurprisingly, then, Vico believes that emphasizing *Critica* at the expense of cultivating *sensus communis* has the deleterious consequence of reducing the student's ability to be eloquent, and even makes the claim that an orator's ability to make a case for something is not coterminous with the truth of the matter, which while it might seem unrelated to any discussion on science and the like, his reasons for saying this are useful for the purposes of highlighting the wide divide between his views and more Cartesian ones when it comes to the issue of probabilistic reasoning and the best way to get to the truth of things.

To see why it might be interesting to contrast Vico's view of the relation between eloquence and truth with how Descartes himself sees things in the *Discours de la méthode*. In particular, Descartes clearly believes there is a strong causal relation between eloquence and the truth of the matter. This is seen when he writes the following: I held oratory [*l'éloquence*] in high regard and was enamored of poetry, but I thought both were gifts of the mind, rather than fruits of study. Those who possess the strongest reasoning and who best order their thoughts in order to make them clear and intelligible can always best persuade others of what they are proposing, even if they were to speak only Low Breton and had never learned rhetoric (1998, p. 4). If one reads this passage carefully, Descartes seems to be assuming that if something is theoretically the case, referring here to his idea that those who reason in the most Cartesian fashion possible should be more capable of persuading others than those who do not, if it seems obviously true as well (which incorporates an element of subjective assessment), then things must indeed be so in reality. Of course, this might be a case of overriding things, but the fact is he provides no evidence for the wide generalization he is making, and its apparent truth seems a bit far from obvious. This in turn makes it seem that he is simply assuming that anything that obviously seems to be the case, must in fact be the case.

If Descartes' reasoning in the passage above almost appears too aprioristic, Vico, as a classically trained expert in matters relating to eloquence, finds

no similar need to advance his own points on the matter in such an abstract manner. After all, he has plenty of empirical examples to draw a probabilistically grounded conclusion which, while not perfectly certain in and of itself (this cannot be adjudicated here), is at least presumably superior to Descartes' own by virtue of its sensitivity to reality or to concrete facts which seem relevant in some way. Vico resorts, in particular, to cases involving the historical figures of Cicero and Marcus Brutus. He blames the latter's limitations as an orator in one specific case on the fact that he was overly obsessed with the truth behind the causes of the things, and this in a way that is akin to the abstract and rigid intellectualism which defined the Stoics. The Stoics, in Vico's eyes, dismissed *verisimilia*, which would thus make them a kind of ancient analog to the Cartesians. That Vico believes this analogy is apt himself is seen, for instance, in an especially unflattering comparison of the two schools in terms of their knowledge of things, describing them as masters of style that are woefully lacking in substance (1990, p. 16).

Now, supposing for the sake of argument that, all things being equal, Descartes' opinion on an issue Vico is an expert at makes his opinion less trustworthy on some level. The reason for this deficit, which has to do with Descartes' almost purely deductive approach to the matter, can be said to reflect, in a certain way, how important it is to foster the cultivation of one's memory and imagination in a way that the Cartesian approach to reasoning clearly does not consider or give much priority to, or so it seems, Vico would think. This is of interest because, if true, it means that even in seeking those same truths that the Cartesian method covets, where one's self-adjudicated verdict of clarity and distinction represents the only criterion for getting at the truth, viewing things exclusively through that prism may also mean missing out on attaining the truth in what would be something of an ironic way. This is a point which, as we shall see, has major implications for the way Vico thinks one should properly do science.

7 Vico's Baconian Solution: On the Relevance of Memory and Imagination in the Sciences

From his observations about the relation between *sensus communis* and the ability to be eloquent, Vico is not concluding that abstract thinking, or purely philosophical reflection, is a bad thing. Rather, the larger point he wants to make appears to be that *Critica's* overvaluation of what is true is something that can backfire. This has important pedagogical implications because, *if Critica* is overemphasized from the beginning of one's education, then it is to be expected that the skills of imagination [*phantasia*] and memory, which are indisputably fertile among the young, will only become atrophied in the long run.

As far as the imagination's case goes, this would result from *Critica's* necessary marginalization of corporeal images, for Vico believes its defenders "rank the unadulterated essence of 'pure,' primary truth before, outside, and

above the gross semblances of physical bodies" (1990, p. 15). As for the cultivation of memory, with all of the specific rules that its cultivation involves, it too is similarly neglected when one's focus is consistently zeroed in on an active and determinate search for truth. Consequently, the ancients, with their imagistic approach to geometry had an advantage over the moderns for Vico, because, as he notes, in "almost all their schools for youths, the role of logic was fulfilled by geometry," and following "the example of medical practitioners, who concentrate their efforts on seconding the bent of Nature, the ancients required their youths to learn the science of geometry which cannot be grasped without a vivid capacity to form images," which meant that, "gradually and gently and in step with the mental capacities of their age, the Ancients nurtured the reasoning powers" of the youth (1990, p. 14).

Vico's points regarding the imagination and memory here can be construed as making for a rather counterintuitive objection to the once presumably obvious idea that the more one applies the Cartesian method in education, said education can better help lead to the advancement of the pro-science and pro-progress agendas of Cartesianism. Interestingly, Descartes himself appeared to see no conflict with a productive use of the imagination and memory, which he in fact endorsed. However, this only came with a simultaneous prioritization of clear and distinct ideas above all other ones, for, as seen in the twelfth rule in the *Regulae ad directionem ingenii*, a rule he notes sums up all the others, one finds him saying the following:

Finally we must make use of all the aids which intellect, imagination, sense-perception, memory afford in order, firstly, to intuit simple propositions distinctly ; secondly to combine correctly the matters under investigation with what we already know, so that they too may be known; and thirdly, to find out what things should be compared with each other so that we make the most thorough use of all our human powers (1985, p. 39).

Vico would implicitly find perspectives like Descartes' naïve. After all, the maximal employment of our imagination and memory is something that is simply practically unrealizable if *Critica* is also taken to be the only method that one should follow on the assumption that it is the best one relative to all others. If Vico is correct about that, it would mean that *Critica*, ironically enough, can never be expected to help someone reach her most desired and highest of highpoints when undertaking some inquiry without the help of something that is not *Critica* complimenting it. This would hold, strangely enough, even if one believes that the aim of *Critica*, i.e., the search for truth, is all that matters. This would hold unless, perhaps, one means by this getting at whatever is true merely for the sake of it, in which case *Critica* alone would suffice, for one can stop at analysis, and skip synthesis, for instance. However, it is clear that this is not the point in coming up with *Critica*, for its practitioners are unlikely to quench their intellectual thirst merely in possessing those simple truths which lay before them through the process of analysis.

Critica, after all, at least as Vico sees things, must be juxtaposed with something, or tempered by something else if it is it to accomplish the kinds of things it was articulated and designed for. As it is, Vico's counterbalance solution is his rather idiosyncratically tinged Baconian understanding of the classical art of *Topica*. As Verene writes, "[t]he art of topics is the ability to use our memory, imagination, and ingenuity (*ingenium*) to bring forth *topoi* or commonplaces in the mind that give us starting points from which to think" (2002, p. 566). Its objective, more specifically, is that of persuasion, and this would be a kind of logical and not merely rhetorical persuasiveness, which is why one could do much worse than L.M. Palmer does in equating the art of topics in Vico with what we would call the "logic of induction" (2002, p. 436), even if this is perhaps a tad simplistic as a description. Now, the ironic quandary detected by Vico in neglecting *Topica* wholesale in favor of *Critica* in education is that it will render one unable able to come up with the best judgments to evaluate in order to start building those superior bodies of knowledge sought by the latter. As Vico sees things, if *Critica* is the only approach celebrated in his age while *Topica*, by contrast, is completely ignored, this will end up hindering whatever truth-related causes one might want to advance, seeing as "the invention of arguments is by nature prior to the judgment of their validity," which means it should even be prioritized if things come down to having to teach one or the other (1990, p. 14).

Topica, then, is in one sense prior to *Critica*, or, perhaps one can phrase things more polemically and say that, in Vico's view, there can be no genuine *Critica* in the absence of exposure to *Topica*. In Vico's view, the aforementioned Antoine Arnauld, author of the 1662 *La logique, ou l'art de penser*, stands on the other end of the spectrum to this view, for he writes, "Arnauld, a man of commanding scholarship, scorns the *ars topica*, and considers of it of absolutely no use" (1990, p. 17). While it is in fact probably a bit of a stretch to say that the Port Royal logicians did express such views in their once-influential textbook, it is certainly not too far-fetched to claim that these thinkers would likely have rejected *Topica* if they had to choose between *Critica* and *Topica*. Vico, however, cannot quite bring himself to opt for *Topica* over *Critica* in that scenario, even if he does grant the former some degree of priority.

On the contrary, Vico is unambiguously clear about the fact that he is no proponent of the idea of resorting to *Topica* alone. The reason for this is that, on its own, *Topica* will lead inexorably lead one down the dark path of falsehood far more easily and often than *Critica* will, even if the latter has its own defects when it comes to its counterproductive and indiscriminate dismissal of *verisimilia*'s positive value (1990, p. 19). His conclusion, then, is not that we must dismiss the latter, but, rather, that we must opt for what can be most accurately described as a negotiated compromise in light of what both can potentially accomplish together. More specifically, Vico says, from a practical standpoint that one should *only* emphasize *Topica* in the younger years and then begin with *Critica* later on, and this so that one can then become the best scientist, orator, artist and so on, that one can eventually

be later on (1990, p. 20), a point which serves to underscore the profoundly pragmatic undercurrent that marks Vico's thoughts on these matters.

In sum, if as André Tosel writes, "Topica is the method of discovery," and also that of invention (1999, p. 491, my translation), it would seem important to encourage its cultivation in order to avoid unnecessarily sabotaging the mind's possible future inventiveness, as would be manifested, for instance, in the extent of the range of arguments it will be able to come up with. Not doing that, or overly prioritizing *Critica*, will only amount to a voluntary self-imposition of mental blinders, one which will manifest its negative epistemic impact in the general production of more epistemically mediocre judgments. As such, Vico would ask, for a method that prides itself so much on its basis in pure reason, is it not irrational for its proponents to simultaneously dismiss the proven wisdom of the ancients simply because of its relatively "lowly" aims, considering all that is at stake here with its marginalization, namely, the attainment of that truth *Critica* is so relentlessly looking for? Vico's account of *Critica*'s dependence on *Topica* should also make it clear, beyond this, that it must necessarily be wrong to make the former serve critical in the determination of the methodology of a science in any kind of thoroughgoing way that might also serve make it its foundation in the process, which is how its proponents would have it. In the end, then, it should only be a tool, useful like any other, but nothing more.

8 On Physics and the Cross-Disciplinary Application of the Geometrical Method

Following Vico's critique of the Cartesian mode of reasoning's inherent limitations in favor of the realization of its own agenda, at least when overly prioritized or taken to be the only method worth employing, he moves on in the fourth section of his text to briefly discuss some issues regarding the nature of science, in particular offering an examination of the practice of physics and the issue of its improper reliance on deduction and the geometrical method, which the pro-Cartesians advocated for. While the geometrical method is foolproof and appropriate within its mathematical domain, transposing its applicability to physics can only represent, in Vico's eyes, a category mistake of sorts, for it equates two wholly different enterprises on a somewhat fundamental level.

In Vico's words, within the domain of geometry "these deductive methods, these sorites, are excellent ways and means of demonstrating mathematical truths," but "whenever the subject matter is unsuited to deductive treatment, the geometrical procedure may be a faulty and captious way of reasoning" (1990, p. 22). For Vico, this approach's overemphasis on reason's supposed ability to know reality purely on the basis of internalist considerations gives one no actual epistemic warrant to claim that reality itself is, apart from one's mind or desires, truly such-and-such a way. Indeed, Vico even surmises that the domino effect that would be brought about by one tiny error would suffice to prove the whole view that this approach hinges on is completely wrong,

meaning proponents of the geometrical method had only been lucky so far not to have been proven wrong, which is not the same thing as being right.

Vico believes all this because, as he sees things, the non-trivial claims expressed by the truths of physics can simply never be demonstrated in any kind of robust sense of the term regardless of any utilization of the same foolproof method of geometry. Why? The reason is simple, its objects cannot be *created* in the same way they can in geometry, where one is able to construct all of its objects from scratch, and this presumably through the imagination. This means that, on some level, one creates its conclusions as well, and this in what is almost a divine kind of way, so to speak. For Vico, all physical truths are properly *verisimilia* instead, ones that happened to be unwarrantedly hyped up as truths and which thus lack the kind of real and genuine or absolute level of epistemic warrant associated with deduction, meaning there is only a mere semblance of an affiliation with mathematics. As Vico himself puts it: “[w]e are able to demonstrate geometrical propositions because we create them; were it possible for us to supply demonstrations of propositions in physics, we would be capable of creating them *ex nihilo* as well” (1990, p. 18).

This last and very striking claim is, as Berlin has noted, Vico’s own extension of Thomas Hobbes’ ideas at the beginning of *De Corpore* (1655), or *On the Body*, where mathematical knowledge is conceived as not being, in principle, “identical with knowledge of the real world... not even with that of physics, no matter how susceptible to mathematical treatment this science has proved to be” (2013, p. 43). It should be noted, however, that in favoring this view, Vico, being the proto-pragmatist that he is, is also not suggesting something as wild as divorcing physics from geometry entirely. If this is not so clear in *DR* itself, then it is worth quoting in full the remarks that he makes on this topic shortly thereafter as found in *De antiquissima Italorum sapientia*:

...not the geometrical method, but geometrical demonstration should be imported into physics. The greatest geometer (such as Pythagoras and Plato amongst the ancients, Galileo among the moderns) consider first principles in physics in terms of mathematical first principles. In this way is it appropriate to explain the particular effects of nature by particular experiments which are the particular works of geometry. In our own Italy, the great Galileo and other brilliant physicists have concerned themselves with geometrical demonstration and explained countless, important phenomena of nature with this kind of reasoning long before the geometric method was imported into physics. The English concern themselves with this alone, and on account of this, publicly teaching physics by the geometrical method is forbidden there. In this way is it possible for physics to make progress (2010, pp. 122-3).

As one sees, then, Vico is quite careful to contrast the geometrical method from geometrical demonstration itself, seeing only the first as involving an improper conflation of the idea of scientific methodology with that of a science’s foundations, which is what the Cartesian approach is essentially guilty of doing in his eyes.

Assuming Vico likely holds a similar view at the time he makes his claims in *DR*, a strong affinity with Plato's thought still complicates the question of how far one can be expected to go with Euclid in a quest for genuinely natural explanations. After all, in offering his own views, Vico curiously remarks that God alone can possess the blueprint, so to speak, of nature: "[t]he archetypal forms, the ideal patterns of reality, exist in God alone" (1990, p. 23). That is, only God can be said to have the inside track, or *knowledge*, of why things are as they are, for he is the only one that can truly *make* them as such. In this sense one finds some interesting parallels here between Vico and the sixteenth-century educational theorist Juan Luis Vives, who belongs to the same "maker's knowledge" tradition that one associates with Bacon. This is something seen, for instance, in Vives' *Satellitium animi* (1524), or *The Soul's Escort*, where he notably claims that "Man knows as far as he can make" (1964, p. 63). Indeed, Lorenzo Casini writes, referring to Vives' views, that human knowledge can be, in this context, "nothing other a finite participation into creation," which then entails that, "investigations into the realm of nature can lead only to conjectures, and not to firm and indubitable knowledge, which we neither deserve nor need" (2011, p. 660). It seems fair to say that the same exact thing applies to Vico here. Beyond this, one should also note that Vico's ideas here foreshadow *De antiquissima Italorum sapientia*'s thesis that the true and the made are convertible notions, which represents what is known as the principle of *verum ipsum factum*, or, simply, the *verum factum* principle, arguably the most famous of all his philosophical ideas.

In the end, then, for Vico, one must ultimately be skeptical, or even pessimistic, and, of course, humble, rather than in any way confident, about believing that we, as the finite humans we are, will ever come close to having our finger on the pulse of reality's truest and most inner workings. That is, one has no right, or epistemic warrant, to assume that one might ever effectively carve nature at its joints, to use the more traditional Platonic phrasing. As a result of this stance, it can be said that when it comes to the issue of scientific cognition, Vico's philosophical identity at this early point in his career is probably best described as something like a Baconian tempered by an extreme epistemological humility. This is a stance that perhaps even borders on a kind of skepticism about external world knowledge in general too, for it implies one cannot ever reasonably warrant having any trust in the physics of one's time. Take, after all, the physics of Vico's time, based as it was on a geometry which humans themselves constructed, which is enough to render one unable to reliably affirm of it as somehow being on "the right track," so to speak. This would hold even in spite of the many advances that physical paradigm had at once point brought forth, or in spite of the fact that its assumptions had not been disproven at the moment Vico was arguing against them.

9 Vico's Critique of Analytic Geometry and the Importance of Visual Thinking

To wrap up Vico's critique and discussion of the effects of the imposition of Cartesianism epistemology within the methodology of the sciences and related topics, it will be useful to look briefly at a relevant and related point he raises about the discipline of mathematics, one which makes up the subject matter of *DR*'s fifth section. In particular, Vico there inquires about, or rather, puts into doubt, what he calls "analysis," by which he means what we today would call the branch of algebra known as analytic geometry, which was, of course, famously founded by Descartes himself.

Specifically, what Vico primarily wants to accomplish in the fifth section of *DR* is to examine analytic geometry's merits pragmatically, or in terms of its role when it comes to contributing to the achievements of mechanics which have been brought forth by geometry in general, and this in order to assess its worth. To this end, Vico begins his inquiry by alluding to an analogy between the moderns and the mythical Oedipus, the decipherer of enigmas:

Let us now proceed to 'analysis.' It must be frankly admitted that the most learned among the Ancients possessed no more ability to solve the problems of geometry than did Davus; we moderns, by the help of our methods, have attained the ingenuity of Oedipus. However, in view of the fact that facility enervates, we must stop to inquire whether modern discoveries in mechanics should be credited to 'analysis,' or not (1990, p. 26).

The reason for needing to put the merits of analytic geometry into question in the first place appears to be that, for Vico, like Hobbes before him, analytic geometry is essentially a reduction of Euclidean geometry into a kind of algebraic manipulation. That is, it is not completely distinct from it, which would thus naturally seem to put the onus on the proponent of analytic geometry to justify what is so great about an alternative approach seeing as it means ditching an older, proven approach to things that might represent a better way of doing things.

For Vico, this is an especially relevant task because inventing "is a characteristic feature of an ingenious mind alone" (*Ibid.*), and analytic geometry, curiously enough, only appears to make progress by chance, or in spite of itself. That is, mathematicians using analytic geometry only seem to find their desired proofs of theorems on the basis of serendipitous *eureka* moments that technically have nothing whatsoever to do with the method itself other than their temporally and sequentially following mathematicians' otherwise overwhelming encounters with a series of symbols (1990, p. 27). Vico's critique here is almost analogous, in a way, to David Hume's groundbreaking argument against the rational justification of our concept of causality, except that in the mathematical case the constant conjunctions Vico would be referring to are not even as constant as are the sunrises each morning. There is, after all, certainly no obvious "next move" that analytic geometry proposes to help

a mathematician solve a given problem. As such, in the absence of images, this kind of geometry only seems to represent, at best, in Vico's eyes, an unappealing alternative, rather than any kind of obvious improvement to what one might call the usual "synthetic" approach to geometry, or geometry *per formas*. At worst, however, it might also represent a hindrance, meaning that, for the sake of achieving maximal scientific progress, it would seem important to put its merits into question and see if it is really the best approach, which is what Vico proceeds to do.

Vico's own answer to the question of its achievements is thus supposed to help determine the overall value of analytic geometry's merits, because if it has solved nothing, for instance, then there would seem to be of no use changing what has most definitely given humanity results in the past. As it is, Vico's answer to his own question will, perhaps predictably, amount to a resounding *no* against analytic geometry's usefulness. Indeed, he will claim that analytic geometry has *not* contributed in any significant way to mechanics. To prove this point, Vico uses a rather crude inductive argument consisting of three premises which, in their original presentation, are peppered throughout with rhetorical language (1990, pp. 29-30). One can simplify them, however, as follows:

- P1) The greatest inventions of modernity were made *before* the time of analysis, e.g., the cannon, sail-powered ship, clock, and church-domes.
- P2) The multitude of great mechanical inventions made by those who disliked analysis *after* it arrived on the scene.
- P3) Those who consciously tried to use analysis failed miserably in their endeavors.

Vico notably offers no examples in favor of premise two, but, in support of premise three, Vico does reference the story of a ship by a so-called "P. Perotus" that sank into oblivion even though it was supposed to be the fastest of its kind. In a recent paper, however, Leonardo Pica Ciamarra notes that the identity of this Perotus has been a mystery for over three centuries, though he does usefully put forth the hypothesis that it might have been a Jesuit priest by the name of Paul Hoste (2011, p. 97), who, in 1697, published the *Théorie de la construction des vaisseaux*, or *Theory of the Construction of Vessels*, something I only mention here lest it might make a difference in someone's assessment of Vico's argument.

As it is, though, the chain of reasoning he offers here is, as a whole, sadly not quite representative of Vico at his dialectical best. Spotty both in terms of its overall structure, as well as in terms of the evidence offered for its claims, as well as notably lacking in terms of its technical engagement with the exact nature of the problems inherent in analytic geometry in terms of its relevant applicability to the kind of thinking involved in mechanics, Vico's argument on this particular score leaves much to be desired. This is also not to speak of the fact that in reading Vico's own presentation thereof, it feels a bit polemical in tone, which gives it the appearance of a lack of objectivity. However, the pedagogical corollary Vico adds to his not-so-watertight conclusion debasing

analytic geometry is a rather interesting one, seeing as it ties back to previous themes that help connect the fifth section of *DR*, which seems a bit disjointed and out of place within the larger text, with the rest of the argument he had been building right until that point.

This corollary will have to do, more specifically, the importance of cultivating one's visual or diagrammatic thinking capacities, for this becomes a kind of pragmatic necessity in light of what has been argued, rather than a mere option, if ingenuity, which is the capacity to bring together things which are otherwise scattered about and unrelated, will go on to continue to be able to flourish in the field of mechanics the way it had done so for humanity historically before the age of Descartes. As such, giving way to an alternative approach that, in his view, is simply relatively unproven in this regard, renders irrational any possible motivation for its adoption, for it is not just an arbitrary decision to favor it, but a bad one as well: “[i]t may be inferred from this that we need to train young minds for the practice of mechanics by means of a close study of visual geometric figures, and not by means of abstract algebraic symbols” (1990, p. 30).

In a way, then, although generally weakly argued, Vico appears to be advancing the view that while a proof itself is not counterfactually dependent on visual or diagrammatic reasoning, the success of geometry and, by extension, mechanics, probably is. The reason this is interesting does not lie in the fact that the entire argument that preceded it was made purely on pragmatic, as opposed to philosophical, grounds, even if these were, once more, questionable in their presentation. Rather, it is because Vico's reasoning suggests diagrams' role in proofs may not be purely heuristic at the end of the day, which is a claim of significant philosophical interest with important implications for the way we are to understand mathematical practice as such. After all, even if, as Marcus Giaquinto has noted, “a time-honoured view, still prevalent, is that the utility of visual thinking in mathematics is only psychological, not epistemological,” meaning something like a diagram “cannot be a resource for discovery, justification, proof, or any other way of adding epistemic value to our mathematical capital” (2007, p. 1), such views, as widespread as they are, are today becoming the subject of much debate.

In particular, it has become clear that, over the last few last decades, or during what might be called the true age of the computer, visual thinking in mathematics has surprisingly regained a prominence which it had once lost almost entirely until this very recent turn of events, and this, in turn, almost helps make Vico look like more of a scientific visionary than he himself might have imagined. Whether humanity would ever have arrived at such a point without modern engineering's use of analytic geometry, however, is, of course, a separate issue. But, then again, Vico's riposte to any related objection would be that it only proves, if anything, the point of his larger argument in *DR*, which is, namely, that ancient and modern study methods can and should find a way to work in tandem, as it is this which will most help advance, rather than hamper in any way, the cause of scientific progress.

10 Closing Remarks

Throughout the foregoing, the picture that has been painted of the early Vico is that of a philosopher of science who was justifiably and not prejudicially worried about the imposition of a generalized form of Cartesianism and the problems involved in dogmatically or uncritically transposing the Cartesian method from its original epistemological context and rendering it part of the methodology and foundation of the various sciences, among other concerns. An attempt was made, in particular, to carefully trace the genealogy of his initial motives in coming to that point and in laying out his eclectic panoply of arguments offered in *DR*. One hope is that it might serve as a counterpoint to the stereotypical picture of Vico's relation and attitudes toward modernity and the value of science, one which has him as an enemy of both due to certain readings concerning his views on history as laid out in the much later *La scienza nuova*. This is because, while the early Vico is generally recognized by scholars as being quite different in important respects from the later Vico, his expressed admiration of the past and openness to the use of ancient study methods, when combined with his questioning of Cartesianism, his wanting to undermine the confidence one can have in the physics of one's time, and his refusing to see anything of value in analytic geometry, might make it easy for some to see *DR* as a sort of prelude to his exegetically controversial later work.

As such, rather than seeing *DR* as potentially belonging to some larger tradition of anti-modern and anti-scientific thought, the hope is that, in having explained his often obscurely presented arguments in the particular way they were presented, readers will agree with the thesis that the early Vico was, in fact, a visionary working in favor of the scientific cause, someone whose overriding was to make modernity even more modern. In the end, the reason he sought to dismantle the status quo's unquestioned assumptions concerning how generalizing Cartesianism would open up, rather than potentially lower, the ceiling for future progress in the various sciences and so on, was attribute to the early Vico being a meta-Cartesian, and this because he put into doubt the instrumentalization of a seemingly unquestionably successful method which, as is well-known, itself assumes one must begin from an initial position of universal doubt in order to get to at any well-grounded and meaningful truths.

In examining Vico's arguments against the Cartesian method's generalization and cross-disciplinary application in detail, it was how, in particular, the Cartesian method's obsession with clarity and distinction in its search for truth was supposed to lead, in eyes, to the progressive marginalization of memory and the imagination, both of which play a crucial role in our thinking capacity's potential. In looking at Vico's examination of the geometrical method in physics, we also saw him begin to advance a radical constructivist idea centering around the creative aspects of scientific cognition in a way that, rather than undermining the possibility and foundations of science, was done more in to favor experimental approaches to physics over more aprioristic ones which might be called faux-mathematical approaches to physics. Finally, in the examination of analytic geometry's supposed inability to help lead us to proof,

Vico was, despite some weaknesses in the nature of his argumentation, curiously shown to be quite wary of the idea that neglecting visual and diagrammatic modes of reasoning in mathematics was not a good thing for doing mathematics, which seems to imply their value goes beyond the merely heuristic, from an epistemic point of view, which makes further examination of his views on this score a matter of contemporary interest.

All in all, then, it has hopefully been shown that the early Vico deserves a better reputation than given credit for as well as more interest on the part of non-specialists focusing on the philosophy of science or its history, for, even when he is wrong on some point here and there or his argumentation fails to satisfy sufficiently, it is clear that he was well-attuned to many of the central issues concerning the foundations and methodology of science and the relation of science to mathematics. In particular, the totality of his views as presented in *DR* clearly serves to carve out a unique identity for Vico among the many thinkers who have dealt with similar themes. This is one which, in particular, places him close to Bacon in some important respects, but also distanced him in other ones, all of which will hopefully serve to inspire further research on the many implications of his early philosophical views on issues related to those addressed here.

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