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The vernacular and the rhetoric of science at the Accademia degli Infiammati in Padua

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Around 1540 in Padua, three members of the Accademia degli Infiammati – Alessandro Piccolomini, Benedetto Varchi, and (presumably) Sperone Speroni – were simultaneously writing their works on mathematics. None of them were mathematicians.[1]

We are accustomed to thinking of mathematics as the foundation of natural sciences, but in the sixteenth century, there was still debate over whether it was a science at all. Among the conditions that enabled the gradual resurgence of interest in mathematics during the sixteenth and seventeenth centuries, one of the most significant was the rediscovery of ancient Greek geometry texts and Arabic treatises on algebra. Neither of these perspectives is foreign to my discussion.

[1] Academies were a type of non-institutional organization that flourished in Italy in the sixteenth and seventeenth centuries. They were characterized by a variety of rules and structures that made them less rigid and more adaptable than universities, and thus better able to respond to the diverse cultural needs and contexts of their time. It is difficult to translate the name of the Accademia degli Infiammati (literally, 'alightened' or 'inflamed'): its emblem shows Hercules on Mount Oeta, and its motto was "When the mortal is burned, the eternal will rise to heaven" (fig. 1). Varchi explained the name as an allusion to the clarity of the Infiammati's teaching method, in contrast to the obscurity of more traditional ones, since the Infiammati "do not intend, as Horace says, to give smoke after flame, but to give light after smoke." Such flamboyant names were quite common for the academies of the time. For instance, a few years earlier in Siena, the Accademia degli Intronati (literally, 'the Stunned') had been founded, and in Florence, in response to the Infiammati, the Accademia degli Humidi was created.

Piccolomini's *De certitudine mathematicarum disciplinarum*, one of the texts I discuss in my project, is considered the starting point – the spark – of the debate on the status of mathematics as a science (fig. 2). On the other hand, the reception of Euclid in the sixteenth century also played a crucial role, as evidenced by Benedetto Varchi's translation of the first book of *The Elements* into the vernacular. However, my research, though limited in time and space, aims to frame this subject within the broader context of the crisis of Humanism—ultimately making it (above all) a question of language.

What We Talk About When We Talk About Mathematics

The proliferation of mathematical writings within the Accademia degli Infiammati can be directly linked to the *editio princeps* in Greek of Euclid's *Elements* and Proclus' *Commentary on the First Book*, printed in Basel by Grynaeus in 1533 (fig. 3). The *Commentary*, in particular, was extraordinarily influential in the sixteenth century: Proclus discusses the nature of mathematical objects with the aim of reconciling the views of Plato and Aristotle. The *Commentary* was crucial in the quest for a *mathesis universalis* – a universal mathematics underpinning all other sciences – and for the related process of mathematizing nature, which from Descartes to Leibniz would engage mathematicians and philosophers of the early modern period. Additionally, Proclus provided arguments both for those who sought to challenge (like Piccolomini) and for those who sought to confirm (like Piccolomini's rival Francesco Barozzi) the solidity of mathematical demonstrations.

In short, Proclus' *Commentary* challenged centuries of philosophical tradition and intensified discussions on the nature of mathematics; it served as a catalyst for those advocating a radical reform of philosophical education or the educational system as a whole. I seek to

demonstrate that for Piccolomini, Varchi, and Speroni, writing about mathematics was little more than a pretext within a broader calling for change.

The edition of Proclus' *Commentary* represents a pinnacle of humanistic philology. One of the most exciting challenges of Humanism between the fifteenth and sixteenth centuries was precisely the search for and recovery of classical antiquity texts. However, textual criticism was not always successful. The case of Euclid is particularly telling: although fifteenth-century humanists had already managed to reconstruct much of the Euclidean corpus – so that by the early 1400s, Vittorino da Feltre, active in the Veneto region, could have his students read *The Elements* in Greek – the first printed Latin edition of Euclid, published in Venice by Erhard Ratdolt in 1482, was based on a much later medieval adaptation: Ratdolt chose to print the version compiled by Campano da Novara in 1259, rather than a more philologically accurate one (fig. 4).

For Renaissance humanists, this was unacceptable. Campano had not sought to restore Euclid's original text but rather to produce a mathematically coherent version, drawing freely on Arabic and Latin sources – and possibly translation from Greek carried out in Norman Sicily – to clarify obscure passages and fill in gaps. In other words, Campano's goal was to provide an up-to-date scientific exposition. The humanist Bartolomeo Zamberti responded to Ratdolt in 1505 with a new Latin edition that was more faithful to the Greek text but disregarding mathematical inconsistencies (fig. 5). As a result, Zamberti's edition was largely impractical for mathematicians. So much so that Jacques Lefèvre d'Étaples, editor of the most widely used Latin translation of Euclid in the sixteenth century (published in 1516), had no choice but to print both Campano's and Zamberti's versions side by side to compensate for their respective shortcomings (fig. 6).

The perception of Latin in the sixteenth century differed significantly from that of the fifteenth. Early humanists looked to the past as a way to move forward: they modeled their Latin

on Cicero, seeking to recover classical purity by eliminating medieval corruptions. In doing so, they reclaimed a linguistic precision necessary for expressing complex ideas. In the sixteenth century, however, this approach became increasingly rigid. As Baxandall observes in *Giotto and the Orators* (1971), "the imitation of Cicero lost most of its interest and dynamic at the moment when a reasonable imitation of Cicero became possible, in the sense that the exercise ceased to be expansive and became instead restrictive." Imitating Cicero became an obligation rather than an aspiration. By the early sixteenth century, this tendency had become so exaggerated that Erasmus mocked it in his *Ciceronianus*, creating the character of Nosponus, i.e., 'sick' of Ciceronianism, obsessively devoted to imitating Cicero's language and style in every detail. Sixteenth-century humanism had acquired a reputation for pedantry and formalism. Writing to one of his students, Varchi recommended him to learn grammar (that is, Latin), but not from grammarians, whose aim is "to teach how to be a grammarian instead of grammar itself, which is learned by reading good authors." It was in this intellectual climate that the Accademia degli Infiammati was born.

Love Enjoys Twenty-Twenty Vision but Talks Like a Myopic

Alongside the discussion on the status of mathematics, another debate raged in early sixteenth-century Italy: the so-called "questione della lingua," regarding what should be the model for linguistic and literary unification. It was Pietro Bembo who identified the winning solution. A Venetian patrician, in 1525 Bembo published the *Prose della volgar lingua*, which set the standard for Italian. Bembo proposed Francesco Petrarca's *Canzoniere* – the most important collection of fourteenth-century love poetry in Florentine vernacular – as a linguistic model. Treating Petrarch the way humanists treated Cicero, Bembo attributed to the vernacular the same dignity as Latin. Petrarch had all the necessary qualities to be considered a classic: his language was two hundred

years old and therefore removed from contemporary spoken use; despite his Florentine origins, he was born in exile and lived in Avignon and northeastern Italy – which may have given him few opportunities to speak actual Florentine; his stylistic hallmark was *medietas*, far from extremes (neither too lofty nor too modest) and, above all, from the practical, everyday use of language. For Petrarch, the vernacular was the realm of absolute experience, a language to be distilled, whereas for Dante the vernacular had been an object of incessant experimentation. For this reason, Bembo excluded Dante from the linguistic canon. Yet Bembo's vernacular classicism was not merely a formal issue: he revitalized the humanist legacy by turning a rigourous linguistic selection into a spiritual exercise, and Petrarch into a model for life. To his correspondent Niccolò Astemio, who in 1529 asked whether Petrarch had truly loved Laura, the woman celebrated in the *Canzoniere*, Bembo dismissively replied, "If Petrarch, with all his beautiful and cherished vernacular writings [366 among sonnets and canzoni, in the *Canzoniere* alone], has not convinced you that he was truly in love with Madonna Laura, I shall certainly not presume to do so." However, Bembo's influence became a victim of its own success, quickly becoming a social code that anyone familiar enough with the vernacular could adopt. The only stronghold to resist Bembo's trend remained Florence, with its its unbroken linguistic tradition.

I Want to Perform Their Favorite Song, but You Know They Love to Sue

Varchi, Piccolomini, and Speroni were all followers of Bembo—followers indeed, but each in his own way. In 1540 the three of them were all in Padua, coming from very different backgrounds. Speroni (1500–1588), a native of Padua, taught logic at the city's university. He resigned from his position in 1528 due to a disagreement over pedagogy.

Piccolomini (1508–1578) came from an ancient Sienese lineage that in the fifteenth century had produced two popes (including the famous humanist Pius II). He moved to Padua to study at the University in 1538. In Siena he had already made a name for himself as a playwright and translator by taking part in the activities of the Accademia degli Intronati.

Varchi (1503–1565), a Florentine, found himself in exile in Padua after having left Florence for political reasons. However, he maintained strong ties with his home city by working as a tutor for young Florentines studying in Padua, and by staying in contact with some of the most prominent figures of Florentine culture. Varchi will be the focus of my presentation.

The University of Padua, founded in 1222, was renowned for its long Aristotelian tradition and its studies in natural philosophy. Bembo's linguistic theory was confined to literature. Speroni tried to reconcile Bembo's thought with the teachings of Pietro Pomponazzi—one of the most unconventional natural Aristotelians, under whom Speroni had studied in Bologna. He put these ideas into a series of three dialogues written in the 1530s, with the best-known being the *Dialogo delle lingue*. Pomponazzi's teaching devalued the study of grammar and philology in favor of philosophy: from a linguistic standpoint, he favored a pragmatic approach that placed content over form. In Pomponazzi's thought, critics have recognized the separation between words and things – between *verba* and *res* – that marks the crisis of Humanism. The culture of the Quattrocento had largely favored Latin at the expense of the vernacular. Pomponazzi wrote in Latin but lectured in his Mantuan vernacular, and in the depiction provided by Speroni in the *Dialogo delle lingue* he envisioned a future in which all Greek and Latin philosophical texts will be translated into the vernacular, thereby eliminating the need to study ancient languages.

The Accademia degli Infiammati was founded in Padua in June 1540, alongside and in competition with the university; its meetings were held on Thursdays and Sundays, the only days

free of university lectures. The legend goes that the Accademia fully supported Speroni's views on language, aiming to make knowledge more accessible by promoting the use of the vernacular. In reality, however, the members did not all agree: for instance, Lazzaro Bonamico, a professor of Greek and Latin at the University of Padua, was chosen by Speroni in the *Dialogo delle lingue* as the representative of those who supported Latin over the use of the vernacular as a language of culture. In the early days of the Accademia, Speroni had agreed to give a series of lectures on Aristotle's *Ethics*, but he pulled out at the last minute and was replaced by Varchi. Varchi delivered the first lecture in the vernacular, but after protests from many French and German students in Padua, who made up a significant part of the audience, he had to switch to Latin.

Varchi had contributed to drafting the statutes of the Academy. The schedule of lectures included readings of Greek and Latin (Homer and Theocritus, Horace and Virgil), as well as contemporary Italian poets (Bembo, Giovanni della Casa, Laudomia Forteguerri); it encompassed not only philosophy but theology and the liberal arts. When Speroni was elected "prince" of the Accademia in November 1541, he changed the rules: he imposed the exclusive use of the vernacular and limited the lectures to texts by Petrarch and Boccaccio. This shift towards specialization – probably to avoid conflicts with the University – led to the disappearance of the Accademia, whose traces were lost less than two years after its foundation.

Varchi, Piccolomini, and Speroni all agreed on the need for a renewal in education. Varchi's pedagogical interests are attested by the letters he wrote in 1539 to his pupil Carlo Strozzi, who was about to join him in Padua. Meanwhile, Piccolomini wrote a treatise titled *De la institutione di tutta la vita de l'huomo nato nobile e in città libera*. His ideas were very similar to those in Speroni's works – specifically, the dialogue *De la cura famigliare* (1535) and the *Discorso sul modo di studiare* (1530) –, so much so that when the *Institutione* was published in 1542, Speroni

accused Piccolomini of plagiarism.[2] Clearly, the two shared many ideas about language. A good example of how Piccolomini embraced the lesson that Speroni learned from Pomponazzi regarding the conception of language happens to be the *De certitudine*.

Gallia est omnis divisa in partes tres

Although it was published in 1547 as an appendix to Piccolomini's own Latin paraphrase of the Pseudo-Aristotle's *Mechanics*, the *De certitudine* was conceived around 1540 and was meant to be read in Padua, as shown by the numerous mentions of the "Patavinis circulis". It is a forty-page militant pamphlet with specific polemic targets—named in the proem as Marco Antonio Zimarra and Agostino Nifo, the two great professors of logic of the previous generation at the University of Padua. When Piccolomini published the *De certitudine* he was well aware that he was going to war; in fact, the opening of the *Mechanics* is a paraphrase of the incipit of Caesar's *De Bello Gallico*: "Philosophia est omnis divisa in partes treis", as if Piccolomini was strapping on his helmet. It was a matter of reading Aristotle's texts directly, with the aid of the ancient commentators who had been rediscovered, challenging both the more recent commentaries and the most popular interpretations within the academic tradition, which, instead of clarifying the texts, had only made them more complicated. Piccolomini shared these ideas with Varchi, who, in turn, wrote about the Latin exegeses of Aristotle: "They are so different and contradict each other, and

[2] While it is true that that the two shared the idea – contrary to Aristotle – of the superiority of the active over the contemplative life, Piccolomini showed a greater interest in mixed mathematics such as mechanics, and his moral instruction was more serious and prescriptive compared to Speroni, who mostly wrote dialogues with more nuanced positions.

themselves, in such a way that, for my part, I consider it almost impossible to derive any explanation from them that is certain or true."

The starting point of the *De certitudine* is Aristotle's claim that "certitudo mathematica non in omnibus expetenda" (one cannot expect mathematical certainty in everything). The traditional interpretation of this passage – from Averroës onward – was that Aristotle was referring to the certainty of mathematical demonstrations, which relied on the *demonstratio potissima*. Paduan philosophers were obsessed with this concept. In truth, the *demonstratio potissima* is foreign to Aristotle, who recognized only two types of demonstrations: the *demonstratio quia* and the *demonstratio propter quid*. It should be remembered that, according to Aristotle, to truly know something is to understand its cause. The *demonstratio quia* proceeds from the effect to the cause; the *demonstratio propter quid*, from the cause to the effect. Aristotle's example of a *demonstratio quia* in the *Posterior Analytics* is as follows:

- Planets do not twinkle;
- what is near the Earth does not twinkle;
- the planets are near the Earth.

In this syllogism the middle term is a truth known to the senses. However, the fact that the planets do not twinkle is not the cause but rather the effect of their being near the Earth. In other words, they are not near because they do not twinkle, but, *because* they are near, they do not twinkle. By inverting the terms of the syllogism, one obtains a *demonstratio propter quid*:

- What is near the Earth does not twinkle;
- the planets are near the Earth;
- the planets do not twinkle.

In this case the middle term shows a causal connection: the planets are near the Earth, *therefore* they do not twinkle. According to the sixteenth-century interpretation, the *demonstratio potissima* is achieved by combining the two demonstrations: through the *demonstratio quia*, which proceeds from what is known (the effect, accessible by induction or through the senses) one obtains an accidental knowledge of the cause; through the *demonstratio propter quid*, one obtains an absolute knowledge of the effect, since the cause that makes it necessary is revealed. In order to have a *demonstratio potissima* the middle term in the *demonstratio propter quid* must be one of Aristotle's four causes (material, formal, efficient, and final), and it must be immediate and necessary.

According to Piccolomini, mathematical demonstrations do not satisfy these requirements. In mathematics there is no efficient cause, since mathematical entities do not move; there is no final cause, because even if the practical applications of mathematics benefit humankind, mathematical entities by their very nature do not tend toward an end. No matter how hard one tries – as Piccolomini writes – it is not possible to imagine for what purpose the alternate interior angles of two parallel lines cut by a diagonal are equal ("Non esse finem in Mathematicis […] neque, si daretur facultas imaginandi, invenire possemus, gratia cuius, vel propter quem finem, anguli exempli gratia, coalterni in parallelis sint aequales"). Mathematics has no material cause because mathematicians do not deal with real objects but with quantity itself, which according to Piccolomini is a mental abstraction—more a property of matter than matter in itself.

As for the formal cause, Piccolomini turns to Proclus. First of all, Proclus acknowledges that there are multiple ways of demonstrating the same property of a mathematical entity—so, Piccolomini argues, mathematical demonstrations cannot be *potissimae*, since the cause of a property in this kind of demonstration must be unique, immediate, and necessary. Secondly,

Proclus admits that some mathematical propositions can be demonstrated reciprocally, when the conclusion of one demonstration can be used as the hypothesis of the second, and the conclusion of the second can be used as the hypothesis of the first—but, Piccolomini objects, an effect cannot be the cause of itself: the cause must be sought elsewhere.

Finally, Piccolomini clarifies the nature of the subject of mathematics: it is quantity, which is the most common of accidents, common to all sensible experiences (length, width, and depth are all quantities), yet separate from them. As such, it is most easily abstracted. Therefore, mathematics cannot be considered a science. Quantity is a simplified, superficial, and external version of the world; it has nothing to do with its essence. Yet it is precisely this quality that gives mathematics its certainty, for quantity, as a simplification, is free from all the particularities of concrete objects.

In conclusion, Piccolomini does not write a treatise against mathematics. Mathematics remains useful for explaining the external functioning of things – the "peel" (the quantitative aspects) – but it does not get to the essence or quality of things, which is the object of natural philosophy. Mathematics ends up being reserved for either a practical use, as in mixed mathematics, or a pedagogical one, as an exercise in abstraction: since children are naturally the most prone to abstraction and have difficulty understanding natural philosophy, mathematics can be their first subject of study in anticipation of more serious endeavors. In assigning mathematics an ancillary position in the hierarchy of knowledge, Piccolomini is not very different from Speroni, who in an unfinished short text titled *Delle mathematice* succinctly explains that mathematics lacks an end and therefore cannot lead to happiness. Of course, happiness in philosophical terms is not the pursuit of happiness as we understand it. Yet, most of us would agree with Speroni…

Truth be told, what interested me in Piccolomini's *De certitudine* is not so much its philosophical content as its rhetorical devices. While dealing with the *De certitudine*, that is with a philosophical treatise in Latin, Piccolomini realized the limits and shortcomings of the genre. So much so that, right after completing the *De certitudine*, Piccolomini would devote himself almost entirely to his project of translating Aristotle into the vernacular. The incipit of the *De certitudine* has always been glossed over: there, Piccolomini admits that he had always had doubts, even as a teenager, about the traditional understanding of the certainty of mathematics; but it was only after having read Proclus' *Commentary* that he dared to say it out loud. This is an implicit critique of the idea that in order to be taken seriously in a university setting, one must always have the support of an *auctoritas*.

On the other hand, Piccolomini often realized how difficult it was to find an unambiguous term in Latin to express what he wanted to say, and he was often forced to list a long series of synonyms or give endless explanations to approximate a concept. After centuries of encrustation by the medieval philosophical tradition, Latin was inevitably compromised: a new language was needed, that is the language of a new science. At one point, Piccolomini cannot resist and explodes: "si constat res ipsa, de vocabulis ne simus soliciti" (If the thing itself is clear, let us not be concerned with the words). In his project of vernacularizing Aristotle, he was inspired by the same pragmatic ideal. Quite different was the stance of Varchi.