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The Heavens Inscribed: the instrumental poetry of the Virgin in early modern France

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Abstract. The expert in the early modern period was frequently looked upon with suspicion. Though expertise was associated with specialized knowledge and skill, it was also associated with cunning, deception and social climbing. Indeed, such knowledge threatened well-defined and time-honoured social and disciplinary boundaries. This was certainly the case with practical mathematics, which was considered by many to be an inferior grade of knowledge, especially when compared with natural philosophy and theology. This spawned numerous attempts to elevate the status of practical mathematics and to lend legitimacy to its practitioners. This article focuses on one such attempt, that of an early sixteenth-century French cosmographer–explorer–poet named Pierre Crignon. Crignon participated in voyages of exploration and was renowned as a cosmographer and navigator, but his contemporaries perhaps best knew him as a poet. The paper examines how Crignon attempted to bring together and legitimate the disparate forms of his expertise as a navigator, cosmographer, humanist poet and theologian through the multivalent medium of his poetry, and in particular through a poem comparing the Virgin Mary to the astrolabe.

What is an expert? Though much recent work has been devoted to this question, I have in mind a relatively little-studied dimension of the expert's expertise.[1] Derived from the Latin *expertus*, 'expertise' is generally defined as the possession of specialized knowledge and skill. This is well known. However, if we travel back to the early modern period, the word had several other quite interesting and unexpected associations. For example, in his *Thresor de la langue françoyse* (1606), Jean Nicot defines an expert not only as one who is knowledgeable and/or practised in many things, but also as someone particularly ingenious (*ingenieux*), which he defines as 'one who has a good mind and understanding'.[2] He adds further precision to this definition with several synonyms: '*artificiosus, argutus, solers*'.[3] The first word of this trinity takes us towards a less-discussed and darker side of expertise. While *artificiosus* retains the strong connotation of skill and knowledge still associated with expertise today, it was also

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1 For example, E. Selinger and R. Crease (eds.), *The Philosophy of Expertise*, New York, 2006; and M. Lynch, 'Circumscribing expertise: membership categories in courtroom testimony', in *States of Knowledge: The Co-production of Science and Social Order* (ed. S. Jasanoff), London and New York, 2004, 161–80.

2 See J. Nicot, *Thresor de la langue française*, Paris, 1606, 271.

3 Nicot, op. cit. (2), 271.

defined as '*ruse, deguisement, fraude*'.[4] We see this same set of meanings trace itself even further back into the sixteenth century, as illustrated by Robert Estienne's *Dictionarium latinogallicum* (1538), where, like Nicot, Estienne defines the expert both as one '*qui a veu et faict beaucoup d'experiences et essaiz*' and as *argutus* – that is, one with a subtle and ingenious mind.[5] Estienne then cites a number of ancient authorities to describe *argutus* (*Subtil*, *Ingenieux*, *Agu*) as '*trop affectee, trop diligente et curieuse*', as 'thin' (*Maigre*) and as 'birds that make a lot of noise' (*les oiseaulx font grand bruit*).[6] Here, too, experience is inflected with the suspicion that claims of superior knowledge and skill were in reality the mark of an imposter, a maker of fakes, a producer of lies, a *parvenu*. Thus to the usual definitions of an expert as one who was 'much experienced in things', or who was considered 'skilful', were grafted other less flattering associations. As Randle Cotgrave said in his *Dictionarie of the French and English Tongues* (1611), an expert is someone 'cunning' and/or 'well seene'.[7] *Cunning*, like *ingenieux*, had positive connotations, of course, but it too shaded into the pejorative with associated meanings such as *regnarder* or *ruser* – that is, someone shifty, crafty or practised in sleight of hand. *Well seene*, like Estienne's *trop affectee*, adds to *cunning* the desire to appear in a favourable light.[8] To be *well seene* similarly suggests an element of deception and dissimulation, of feigned display and/or trickery, someone who 'perverts a truth with shifts, trickes, or subtilties'.[9] This implies, once again, that the expert's desire to be 'well seene' might also be associated with purposive attempts to garner power and prestige through guile and perhaps even fraud; in other words, that the 'expert' might be considered something of a social climber, as hinted at, not so subtly, by Estienne's characterization of the expert as '*fine et affetee*'.[10]

There can be little doubt that the negative associations bound up with expertise were closely associated with its relationship to *experience*. As Cotgrave defined it, experience is 'cunning, skill, knowledge, wisedome, gotten by much practise, and many trialls'.[11] Experience, here, had less to do with naked acts of perception than with hard work, practice and wisdom gained through careful and repeated rehearsal. This definition of 'experience' is somewhat at odds with our own, though perhaps not entirely opposed to modern notions of expertise. In early modern Europe, experience was understood to refer to how nature usually, i.e. universally, behaves, not to perception, empirical

4 *Dictionnaire de L'Académie française*, 1st edn, Paris, 1694, 58. Thus Sir Richard Barckley's 1598 *Discourse of the felicitie of man* qualifies certain men as '*artificiall* apes' who counterfeit 'a formall kinde of strangers civilite'. R. Barckley, *Discourse of the felicitie of man*, London, 1598, 327.

5 R. Estienne, *Dictionarium latinogallicum*, Paris, 1552 (published originally in 1538), 508.

6 Estienne, op. cit. (5), 118.

7 See R. Cotgrave, *A Dictionarie of the French and English Tongues* (facsimile of the first edn, London, 1611), Columbia, SC, 1968, np. 419.

8 Cotgrave, op. cit. (7), 804, 841.

9 Cotgrave, op. cit. (7), 841.

10 Estienne, op. cit. (5), 118.

11 Cotgrave, op. cit. (7), 419.

investigation or induction from discrete events.[12] Aristotle's *Posterior Analytics* is the touchstone here:

> One necessarily perceives an individual at a place and at a time, and it is impossible to perceive what is universal and holds in every case. Since demonstrations are universal, and it is not possible to perceive these, it is evident that it is not possible to understand through perception.

Rather, 'from perception there comes memory … and from memory (when it occurs often in connections with the same thing), experience; for memories that are many in number form a single experience'.[13] Thus experience, for Estienne, was synonymous not only with expertise but with proof (*espreuve*), based on a reference to common knowledge rather than on the assertion of a personal experiential claim. Experience of discrete phenomena was not really knowledge at all, for it was thought to be concerned with ephemera, particulars and singularities, or, as they were frequently referred to, with monsters. Coincidently, monster refers not simply to contingent experiences or to 'monstrous' anomalies of nature, but also to one who, contrary to nature, transgresses the boundaries of expected social (or professional) behaviour.[14] The parvenu who through cunning, skill and expertise rose above his station was just such a singular monster. This article is concerned to show how one such monster, a navigator–cosmographer–mathematician from Dieppe named Pierre Crignon (1464?–1540) attempted, through a series of complex mediations, to escape these shadowy associations to transform his expertise into creditworthy and laudable knowledge and himself into an expert worthy to be heard by powerful merchants, princes and kings.

Pierre Crignon and a poetic astrolabe

Though his voyages of exploration to Brazil and the East Indies are well known, we know next to nothing of Pierre Crignon's early life. Perhaps, like his friend and captain, Jean Parmentier, he had little if any scholarly training.[15] Nevertheless, he appears to have been closely connected to the humanist circles associated with his employer, the Dieppois merchant, *conseiller du roi*, *vicomte-gouverneur-capitaine de Dieppe*, Jean Ango.[16] Around Ango gathered some of the brightest lights of provincial humanist culture in early sixteenth-century France: men such as the poet Jean Doublet, translator

12 P. Dear, *Discipline and Experience: The Mathematical Way in the Scientific Revolution*, Chicago, 1995, 20–1.

13 Quoted in Dear, op. cit. (12), 22, from Aristotle, *Posterior Analytics*, in *The Complete Works of Aristotle: The Revised Oxford Translation* (ed. J. Barnes), Princeton, 1984, I. 31. See also P. Dear, 'Mysteries of state, mysteries of nature: authority, knowledge and expertise in the seventeenth century', in *States of Knowledge: The Co-production of Science and Social Order* (ed. S. Jasanoff), London and New York, 2004, 206–24, esp. 207–9.

14 As Nicot, op. cit. (2), 416, put it: '*Dressé et fait ou habitué à faire grande monstre de soy.*'

15 'Il n'a pas beaucoup hanté les escolles', from the 1531 prologue of 'Table des Œuvres de Jean Parmentier' by Pierre Crignon; see *Jean Parmentier, Oeuvres poetiques* (ed. F. Ferrand), Geneva, 1971, 3.

16 M. Mollat, *Le Commerce maritime normand à la fin du Moyen Age: Etude d'histoire économique et sociale*, Paris, 1952, 535–8. Also see E. Guénin, *Ango et ses pilotes d'après des documents inédits, tirés des archives de France, de Portugal et d'Espagne*, Paris, 1901.

of Terence and Cicero; the brothers Miffant, who translated Cicero and Xenophon; the Abbé Pierre Desceliers, the renowned mathematician, astrologer and cartographer; and, of course, Jean Parmentier, pilot, explorer, maker of maps, writer of court fêtes and religious poetry, translator of Sallust, and best friend and employer to Pierre Crignon.[17] Like Parmentier, Crignon gained fame not only for his skills as a navigator and explorer but also as a poet. Indeed, along with Parmentier, he was singled out by his contemporary Pierre du Val as one of the best poets in all of France.[18] He was a frequent competitor at the annual poetic concourses sponsored by Rouen's *Puy de palinod* and Dieppe's *Puy de l'assomption*. His contributions often won the day. In Rouen, he was crowned laureate in 1517 and 1527 with poems such as *Purple, Excellent for Dressing the Great King*,[19] and *The King of the Treasures of Eternity*.[20] Some time in the first third of the sixteenth century Crignon read to the assembled members of Rouen's *Puy* a poem, *Our Astrolabe Where the Sphere Is Comprised*, that provided a detailed exposition of the many similarities between an astrolabe and the virgin mother of God. The poem, reprinted as item I in the Appendix to this paper, compared every aspect of the mathematical instrument's design, ornamentation and use to the Virgin, for both, he explained, were defined and created with reference to the cosmic perfection and virtuous symmetry of the celestial sphere:[21]

> Our astrolabe where the sphere is comprised,
> Is the humble Virgin in her conception,
> The maker is God, who bestows grace upon her,
> For his son to receive.
> The dawn meridian line is her inception,
> The circles round and graduated,
> These are the virtues God confers on her.
> The equator is justification,
> The tropics her glory, exaltation
> Of all the virgins he bestows honor, he prefers her.
> The zodiac and rete,
> Gifts of beauty and perfection,
> The right angles, the benediction
> Of the All Powerful, who watches over and sustains her,
> Who made her exactly according to his intention
> To contain by his extension,
> The perfect circle that encloses and contains him.

17 See, for example, Guénin, op. cit. (16), 20–1.

18 P. du Val, *Le Puy de souverain amour*, facsimile edn introduced by P. LeVerdier, Rouen, 1920, originally published 1543, fol. A iv(v).

19 Bibliothèque nationale (hereafter BN), Ms. Fr. 379, fol. 10(r).

20 BN, Ms. Fr. 379, fol. 28(r-v).

21 In a similar *chant* written earlier in the sixteenth century, Nicolle Osment compares the Virgin to a 'sphere showing all the secrets of the heavens'. See P. Vidoue, *Palinodz, chants royaulx, ballades, rondeaulx, et epigrammes, a lhonneur de limmaculee Conception de la toute belle mere de dieu Marie Patronne de Normans presentez au puy a Rouen* … sl, 1525. Reprinted by E. deRobillard de Beaurepaire, Rouen, 1897, fols. xxiv–xxv.

The one who made the great mappemonde
Well proportioned in zones and climates,
Watching over human beings on the world's seas
Lost, in desolate peril and affliction,
Having lost anchors, sails and masts,
In storms and winds of ingratitude,
Not knowing under which latitude
They were led, navigating astray,
They plot their course taking the finest line of gold,
To bring them to a safe and good land,
Just astrolabe where the sphere is comprised.

He turned it and made it round,
Then graduated the limb with compass.
Of purity made the face (the mater) profound
To receive tables that are not
Tarnished with sin, for without failing by so much as a pace,
Four right angles he promptly put in their place,
Conferring bountiful beauty upon her.
Each tropic was put in order
And the equator too, without repetition,
To confirm her as the king's instrument,
Just astrolabe where the sphere is comprised.

On the tympana, turned in gold pure and holy,
Of which beauty surpasses human imagination,
He made with his compass, without error,
The azimuth and the almicanaratz,
The dawn line without illusion,
The right zenith of meek humility,
True horizons, and accurate hours;
Then put beneath the rete carrying
The zodiac's procession of stars,
And the rete's index that shows him the law,
Just astrolabe where the sphere is comprised.

On the other side, it is surrounded with stars,
Where are portraits, by degree high and low,
Signs of love, days and months, where is found
The year in which wars and quarrels end.
Then the alidade is added, with delight,
To demonstrate the phases of the altitude
Of the true sun at its highest point
When it will come, by the line of faith,
To enter into the well sighted pinule.
And then will be found there, as I believe,
Just astrolabe where the sphere is comprised.

From the *alchitoth* (the pin assembly) where charity abounds
All is conjoined, from which the poor grow weary,
Seeing the sphere in the vast and limitless ocean

contained, they have joy and solace
And they evade death's snares and traps,
Pondering, under such similitude,
That the Virgin and mother, in holy sanctity,
Would contain God and that, by his will
Would be by grace in idea so seized
That one would hardily say, without fear,
Just astrolabe where the sphere is comprised …[22]

A computer of brass

The astrolabe, or star-finder, upon which Crignon based his *chant*, was a model of the heavens inscribed in brass. A kind of analogue computer, it was, at least in theory, capable of facilitating a number of complex astronomical and geometrical calculations.[23] In an era before accurate and portable clocks it could be used to tell time; it could be used in surveying and to measure altitude; in navigation it could be used to determine geographical latitude and the direction of true north. Additionally, it played an important role in casting horoscopes, for it allowed astrologers to reference an 'accurate' map of the heavens for a given time or locale.

The front of the astrolabe has a raised circumference called a limb. This is inscribed with a degree scale (usually a scale of hours); on the interior of the limb (the *mater*) a universal astrolabe can be fitted with alternative plates which depict the night sky as stereographically projected onto the plane of the equator from different latitudes. An observer selects a plate according to their latitude and fits it into the *mater*. By this means a system of celestial coordinates based on the reference point of the observer's horizon is established. Overlaid above this celestial template is a second projection: a moveable skeletal or open-plan star map, known as the rete or spider, which points out prominent stars and the ecliptic of the sun. The rete can be rotated above the latitude plate to mimic the daily apparent motion of the celestial sphere. The changing positions of the stars in altitude and azimuth can be charted by reference to the plate lying below it. On the other side of the astrolabe is the alidade, a pivoted arm lying across the back face of the instrument. This has small sighting holes (the pinules) that are raised above the astrolabe's plane. If the instrument is held vertically by the shackle and ring at the top or throne, the alidade can be used in conjunction with a fixed scale that runs along

22 I would like to thank Hélène Mialet for help and advice in translating this poem. See *Jean Parmentier, Oeuvres poetiques*, op. cit. (15), 62–5; the poem can also be found in D. Hüe, *Petite anthologie palinodique (1486–1550)*, Paris, 2002, 171–4; also see BN, Ms. Fr. 1739, fol. 99. This poem was not signed, but is attributed to Parmentier by Ferrand. Denis Hüe has since definitively established that it was by Parmentier's navigator, Pierre Crignon. D. Hüe, 'Un nouveau Manuscrit palinodique, Carpentras, Bibliothèque Inguimbertine n° 385', in *Le Moyen Français* (1995), **35–6**, 175–230; for a contemporary account of the astrolabe see J. Focard, *Paraphrase de l'astrolabe*, Lyon, 1544.

23 See J. A. Bennett, *The Divided Circle: A History of Instruments for Astronomy, Navigation and Surveying*, Oxford, 1987, 14–16; and A. Turner, *Early Scientific Instruments: Europe 1400–1800*, London, 1987, 11–16; for the planispheric astrolabe and its workings see H. S. Saunders, *All the Astrolabes*, Oxford, 1984.

the outside rim of the instrument to measure the height of a given object. For example, to establish a model of the night sky all that is required, at least in theory, is to measure the altitude of one of the stars on the rete by using the alidade and degree scale on the back of the astrolabe, then to adjust the star represented on the rete to the appropriate altitude lines. By following this method, the time, as well as the positions of other celestial bodies, can be determined.

Yet despite these putative practical uses, the cumbersome nature of handling the astrolabe in the field, often in less than perfect conditions, combined with limitations imposed by its necessarily small size (usually between ten and forty centimetres), the lack of textual corroboration of instances of use, as well as the precious nature of the materials utilized in its construction (typically gilt brass), make it extremely unlikely that the astrolabe was used for anything except as a showcase item for display or for didactic purposes in teaching the principles of astronomy and geometry. Nevertheless, according to Crignon's poem it was by using an astrolabe that the intrepid sailor, 'lost on the ocean's expanses without anchor, sail or mast', could navigate to 'a safe and good port'. Despite his assurances, however, the astrolabe he describes in his *chant* was not a navigational instrument. This is not to say that astrolabes were not used for navigation, but rather that such astrolabes were entirely different from the one described by Crignon. Appropriately, the navigational instrument was called a mariner's astrolabe.[24]

The first reference to the mariner's astrolabe coincides with the expansion of Atlantic shipping towards the end of the fifteenth century. More closely resembling a simple quadrant or a theodolite turned on its side than the astrolabe described by Crignon, it was an eminently practical instrument particularly suited to long-distance oceanic navigation.[25] It has very little in common with its namesake. Mariner's astrolabes were usually made of brass or iron, with the plates, inscriptions and decorative paraphernalia that could catch the wind and interfere with functionality removed. Essentially this instrument was a heavily weighted circular ring. On its limb a degree scale was inscribed. The alidade swivelled around and across this divided circle. To navigate a ship, sun or star would be sighted through the pinholes on either side of an alidade. A traveller would take readings of the sun on successive days at its highest point as it crossed his meridian. The angular distance could then be determined by comparison with measurements of the horizon; this, adjusted with appropriate declination tables, could then be used to find a ship's approximate bearings. This contrasts markedly with the detailed craftsmanship and intricately inscribed plates of a planispheric astrolabe,

24 See A. Stimson, *The Mariner's Astrolabe: A Survey of Known Surviving Sea Astrolabes*, Utrecht, 1988; D. Waters, *The Sea or Mariner's Astrolabe*, Coimbra, 1966; Bennett, op. cit. (23), 33–4; Turner, op. cit. (23), 65–8; G. Beaujouan and E. Poulle, 'Les Origines de la navigation astronomique au XIVe et XVe siècles', in *Le Navire et l'économie maritime du XVe aux XVIIIe siècles* (ed. M. Mollat and O. de Prat), Paris, 1957, 112–13. There are very few surviving mariner's astrolabes. In the Oxford Museum for the History of Science, for example, which has the largest collection of astrolabes in the world, there is only one mariner's astrolabe.

25 See J. Law, 'On the methods of long-distance control: vessels, navigation and the Portuguese route to India', in *Power, Action and Belief: A New Sociology of Knowledge? Sociological Review Monograph* (ed. J. Law), London, 1986, 234–63.

which in theory could be used in surveying, navigation, time-telling and artillery but in reality was not.[26]

Given all this, why did Crignon deliberately model his poetic astrolabe on a device that was never used for navigation? The apparent mistake was surely deliberate, for there can be no question that Crignon, an experienced navigator and explorer, knew the difference. Indeed, in his chronicle of Parmentier's voyage to Sumatra he took pains to note that he measured the height of the sun at midday almost every day.[27] There is little likelihood that he did this with a cross-staff, which was best suited for observation of celestial objects less than forty-five degrees above the horizon and was certainly not a tool one would want to use for naked-eye solar observation at high noon. That Crignon used a mariner's astrolabe can be plausibly deduced not only from his journal, but also from a poem written by his captain and friend, Jean Parmentier. Read before the *Puy* at approximately the same time as Crignon delivered his *Just Astrolabe Where the Sphere Is Comprised*, Parmentier's chant, *The Mapemonde of Human Salvation*, reprinted in the Appendix to this paper as item II, described how difficult it was for a 'cosmographe' to use an astrolabe to sight the pole star as his ship approached the equator:

> The wind behind him, he follows the North star,
> His chart in hand, he navigates
> Beneath the zenith of his own (the Northern) hemisphere,
> By measuring, in parallel lines
> The mapemonde of human salvation.
> But for this pilot, by whose reckoning
> The seas are crossed, his star reclines
> So that, for the elevation
> Of the pole to see, the astrolabe inclines.
> But the height of the bear [Ursa Minor] is concealed
> Just as it is sighted, its light disappears
> By retrograde (motion), in quadrature [in the shape of a square]
> Such that the sailor has no idea, by knowledge or ruse [craft, *cautelle*]
> How to pilot his ship, except to always have hope
> That its light will give him a glimmer of
> The mapemonde of human salvation.[28]

26 As Thomas Blundeville notes in *His Exercises, containing sixe Treatises … which Treatises are verie necessarie to be read and learned of all yoong Gentlemen that … are desirous to haue knowledge as well in Cosmographie, Astronomie, and Geographie, as also in the Arte of Nauigation, etc.*, London, 1594: 'Broade astrolabes, though they be thereby the truer, yet for that they are subject to the force of the winde, and thereby ever moving & unstable, are nothing meet to take the altitude of anything, and especially upon the sea; which this to avoid the spaniards doe commonly make their Astrolabes or Rings narrow and waightie, which for the most part are not much above five inches broade, and yet doe waigh at least foure pound, and to that end the lower part is made a great deale thicker than the upper part towards the ring or handle. Notwithstanding most of our English Pilots that bee skilful doe make their Sea Astrolabes or rings sixe or seven inches broade, and therewith very massive and heavie, not easie to be moved with everie wind.' Regarding these difficulties, see Bennett, op. cit. (23), 34; and D. Howse, 'Navigation and astronomy', *Renaissance and Modern Studies* (1986), **30**, 62–3.

27 See *Le Discours de la navigation de Jean et Raoul Parmentier de Dieppe*, attributed to Pierre Crignon (ed. M. Ch. Schefer), Paris, 1883.

28 BN, Ms. Fr. 1537 fol. 96(v)–97(v); *Jean Parmentier, Oeuvres poetiques*, op. cit. (15), 25.

It thus seems obvious that we attribute Crignon's 'slip' to poetic license. The complexity of the planispheric astrolabe clearly provided a much richer technical vocabulary for Crignon's verse than did the bare-bones navigational instrument. Nevertheless, more is going on here. To modern eyes it might appear that the association of the mariner's astrolabe with the planispheric astrolabe was a means of grounding the abstruse and difficult theories that mathematicians and astrologers employed in such eminently practical uses as navigation.[29] Yet in the early modern period this gesture to a rhetoric of utility might have done more to undercut the efficacy of the navigator's craft than to bolster it.[30] Though counterintuitive, it was just the opposite move that needed to be made: navigators and mathematicians had to steer clear of the monsters of the contingent world in favour of more abstract universally recognized truths. An important step in this process was to associate the working navigational instrument with its more lavish and vastly more complex cousin, the planispheric astrolabe.

Planispheric astrolabes were relatively esoteric instruments in the early sixteenth century. Few had experience with them; fewer still possessed Crignon's recondite knowledge of their complex structure and use. His poem pre-dates Dominique Jacquinot's *L'Usaige de l'astrolabe* (Paris: Jehan Barbé, 1545) and Jaques Focard's *Paraphrase de l'astrolabe contenant: Les Principes de la geometrie, la sphere, l'astrolabe, ou déclaracion des parties de la terre* (Lyon: de Tournes, 1546). Navigation in the North Atlantic was at this time a kind of craft knowledge learned through long experience in well-known and frequently travelled waters, having more to do with body-to-body transference of skills honed by constant practice than with books, elaborate instruments or mathematical abstractions.[31] It required knowledge of the tides and of landmarks; familiarity with birds, fish, kelp and water conditions; and experience in the use of a sounding line, a compass and perhaps a portolan chart. The use of new navigational instruments and the mathematical techniques associated with them were relatively well known on the Iberian peninsula in the early years of the century.[32] But this knowledge diffused slowly. Thus, for example, across the channel and as late as 1575 'even such relatively simple equipment as the cross-staff, the mariner's astrolabe, and the plane chart had been used aboard English ships for just a decade or two at the most'.[33] Navigation in the early sixteenth century was a menial craft carried out by practical men in familiar waters. There was nothing particularly learned or valorizing

29 See, for example, K. Neal, 'The rhetoric of utility: avoiding occult associations for mathematics through profitability and pleasure', *History of Science* (1999), **37**, 151–78.

30 Natalie Zemon Davis makes a similar point regarding commercial arithmetic: 'honorable association for business was not conceived in terms of the fruits of commerce and finance. Rather business lost its stigma because business arithmetic was allegedly a liberal art and somehow related to the discovery of "great secrets and high mysteries"'. N. Zemon Davis, 'Sixteenth-century arithmetics on the business life', *Journal of the History of Ideas* (1960), **21**, 18–48, 29.

31 See E. H. Ash, *Power, Knowledge, and Expertise in Elizabethan England*, Baltimore, 2004, 89.

32 Waters, op. cit. (24), 16. This is not to say that there was not resistance amongst Spanish pilots to the introduction of mathematical techniques of navigation; see A. Sandman, 'Mirroring the world: sea charts, navigation, and territorial claims in sixteenth-century Spain', in *Merchants and Marvels: Commerce, Science, and Art in Early Modern Europe* (ed. P. H. Smith and P. Findlen), New York, 2002, 83–108.

33 Ash, op. cit. (31), 139.

about it. At the same time, the loss of a ship and its crew could have devastating financial consequences for those who had invested in it. This lent impetus to efforts to ensure the safety and dependability of transatlantic travel through the development of new mathematical techniques of navigation based on universal theoretical principles and not on dangerously contingent local knowledge.[34] Such techniques had to be 'marketed' as necessary and useful tools to ensure the profitability of overseas trade. At the same time, as we shall see, this marketing also needed to appeal beyond mere economic interests, to social, intellectual and spiritual ambitions as well.

Navigating an audience

In writing his poetic astrolabe for the *Puy de palinod*, Crignon was playing to a perfect audience of actual and potential patrons. In addition to well-known courtiers, participants in the *Puy de palinod* included some of the most celebrated citizens of Dieppe and Rouen, including members of the old nobility, high-ranking members of the robe, wealthy merchants and important ecclesiastical officials. Thus not only was the cream of Rouen society present when Crignon read his poetry, including such luminaries as Pierre Monfauld, the president of Normandy's *parlement*; Louis Cannossa, Bishop of Bayeux and correspondent of Erasmus; and Clément Marot, France's most illustrious (and infamous) poet, but also important merchants, shipowners and civic leaders, such as Jehan Bonshoms, Gillebert le Fevre and Pierre Couldray. These men provided crucial financial and logistical support for overseas trade and exploration at a time when the French king was far more concerned with Milan and Naples and his rivalry with Charles V than he was with the transatlantic interests of Normandy's merchant community.[35] They traded in wool, silk, spice, alum and brazil wood, used to make brilliant red dyes.[36] In the first half of 1529 alone, over two hundred tons of the *bois de braise*, as it was known, were brought into Rouen's port.[37] However, the poetry read out before the assembled members of the *Puy* was far more than an attempt to garner the patronage of Normandy's merchant humanists for his skills as a navigator. It was also a form of symbolic address through which Crignon articulated the interests of, and

34 See Ash, op. cit. (31), for example 96, 103, 139. Not coincidentally, the development of new navigational techniques was paralleled by the development of new commercial techniques of maritime insurance and underwriting. Indeed, not long after Crignon produced his *chant* praising the many virtues of the astrolabe, the first book published in France on maritime insurance, the *Guidon, stile et usance des marchands qui mettent a la mer*, was published in Rouen; see Mollat, op. cit. (16), 393; and L. A. Boiteux, *La Fortune de mer. Le Besoin de securité et les débuts de l'assurance maritime*, Paris, 1968.

35 See, for example, A. C. Vigarié, 'France and the great maritime discoveries – opportunities for a new ocean geopolicy', *Geo-Journal* (1992), **26**, 477–81.

36 See M. Wintroub, *A Savage Mirror: Power, Identity and Knowledge in Early Modern France*, Stanford, 2006, esp. Chapter 2; on the importance of this trade see also M. Mollat, *Histoire de Rouen*, Toulouse, 1979, 154; *idem*, 'Anciens Voyages Normands au Brésil', *Bulletin de la Société de l'histoire de Normandie*, Rouen, 1887–90, **V**, 236–9; *idem*, op. cit. (16), 249–67; E. Gosselin, *Documents authentiques et inédits pour servir à l'histoire de la Marine Normande*, Rouen, 1876, 142–71; and M. Desmont, 'Le Port de Rouen et son commerce avec l'Amérique', *Société Normand de géographie* (1911), **XXXIII**, 404–10.

37 See Mollat, op. cit. (16), 257.

appealed to and associated himself with, like-minded courtly and provincial elites who could help him on his journey from lowly navigator to laurel-crowned poet.

Vernacular poetry in the first half of the sixteenth century played an important role in the French court with the likes of André de la Vigne, Jean Lemaire de Belges and Jean Marot writing verse and orchestrating royal ceremonial to immortalize the reigns of their royal patrons.[38] This gave poetry and its exponents new-found status and prestige both at court and in the provinces.[39] The valorization of poetry and the persuasive power of eloquence it was thought to embody paralleled the growth of new urban centres of culture and commerce and the civically minded bourgeoisie that ruled them. The linguistic expertise that they cultivated went hand in hand with increasingly centralized bureaucratic forms of fiscal, military and juridical administration.[40] It is therefore not surprising that at the same time that poets were composing verse to honour princes and kings, they were also participating in religious poetic confraternities organized by the educated, urbane and cultured elites of provincial cities, such as Rouen, seat of Normandy's *parlement* and, after Paris, the second-largest city in France.[41] These confraternities were at the centre of Normandy's spiritual and cultural life. The *Puy de palinod* was among the most important of these. Each year on 8 December, the day of the Immaculate Conception of the Virgin Mary, a competition would be held where *facteurs* (agents) of the *Puy* would read their poetic compositions dedicated to the Virgin. Organized around mastery of complex poetic theory as detailed in a two-volume grammar written specifically for this purpose (Pierre Fabri's *Le Grant et vray art de pleine rethorique*), the poems written for these confraternities evidence an unusually high degree of literary skill and expertise. An invitation to the annual competition of Rouen's *Puy* printed in 1516 explained: a *chant royal* should contain '*xj lignes pour chacun baston sans coupes feminines silz ne sont synalimphées*'.[42] In other words, each stanza (*baston*) of a *chant royal* was to have eleven lines, with caesurae (*coupes*) structured into each line placed after the fourth masculine syllable (unless the tonic final 'e' was elided (*synalimphées*), thus making the syllable feminine).[43] The 1533 invitation went even further, stating that submissions had to be 'well written, with

38 See, for example, F. Joukovsky, *La Gloire dans la poésie française au XVI^e siècle*, Geneva, 1969.

39 It is important to note that whereas Aristotle might have distinguished between rhetoric, grammar and poetry, the tendency of sixteenth-century humanists was to conflate them. See, for example, E. Rummel, *The Humanist–Scholastic Debate in the Renaissance and Reformation*, Harvard Historical Studies 120, Cambridge and London, 1995; and P. Kristeller, 'The modern system of the arts', in *idem*, *Renaissance Thought II: Papers on Humanism and the Arts*, New York, 1965, 163–227.

40 See, for example, M. Wintroub, op. cit. (36); T. Hampton, *Literature and Nation in the Sixteenth Century: Inventing Renaissance France*, Ithaca, NY, 2001; W. Mignolo, *The Darker Side of the Renaissance: Literacy, Territoriality and Colonization*, Ann Arbor, MI, 1995; and B. Anderson, *Imagined Communities*, London and New York, 1983, esp. 37–46.

41 This honour was also claimed by Lyon. Regarding the *Puy de palinod*, see Wintroub, op. cit. (36), esp. 64–90; D. Hüe, *La Poésie palinodique à Rouen (1486–1550)*, Paris, 2002; G. Gros, *Le Poète, la Vièrge et le prince du Puy: Etude sur la poésie mariale en milieu de cour aux XIV^e et XV^e siècles*, Paris, 1992; C. B. Newcomer, 'The Puy at Rouen', *Publications of the Modern Language Association of America* (March 1916), **31**, NS, **24**, 211–31; E. de Robillard de Beaurepaire, *Les Puys de Palinod de Rouen et de Caen*, Caen, 1907; G. Lebas, *Les Palinods et les poètes dieppois*, Dieppe, 1904.

42 Bibliothèque Municipale de Rouen, Ms. 1063 (Y. 16), fols. 1–2.

43 Wintroub, op. cit. (36), 69.

correct orthography, diphthongs and grammar; otherwise, they … will be rejected'.[44] In terms that Pierre Bourdieu has made familiar, the cultivation of arcane and highly technical grammar by the *Puy*'s poets demarcated a field of expertise that distinguished them as part of France's new bureaucratic–civic elite.[45] As Pierre Fabri aptly put it, '*rhetoric donc est science politique*'.[46] Indeed, he averred, rhetoric is a science of 'royal nobility' (*noblesse royale*) and 'magnificent authority' (*de magnifique auctorité*).[47] He who possesses knowledge of it excels over all other men (*il a excellence sur les aultres hommes*).[48]

Crignon's solidarity with Normandy's merchant poets was a performed act of social distancing, a means of distinguishing those who possessed the hard-won and recondite linguistic expertise to participate in the annual competitions of the *Puy* from those who did not. As Fabri put it, it was a means of discriminating between '*Sapiendum ut pauci en considerant la substance et signification*' of language, and '*loquendum ut plures en ensuivant le commun langage*'.[49] Not only did these merchant poets link their superior social status to spiritual justifications through the writing of Marian verse, they also attempted to link it to the growing power of the state. In this sense, their poetic contributions to the *Puy de palinod* coincided with efforts of Tory, Lefèvre d'Etaples, and Budé at court to transform the vernacular into a language suitable to guide the ship of state.[50] The reference to the king's instrument in Crignon's poem was thus meant in a double sense: first, to identify the king (and France) with Norman exploits on the high seas, then to link these exploits to the fulfilment of God's injunction to spread His redemptive Word (in French) throughout the world.[51] Like the Virgin, the astrolabe was

44 BN, Ms. Fr. 1715, fol. 1(v)–2(r).

45 P. Bourdieu, *Distinction: A Social Critique of the Judgement of Taste*, Cambridge, MA, 1984; *idem*, 'Le Langage autorisé: Note sur les conditions sociales de l'efficacité du discours rituel', *Actes de la recherche en sciences sociales* (1975), **5/6**, 183–90; *idem*, 'Social space and the genesis of groups', *Theory and Society* (1985), **14**, 723–44; *idem*, 'Social space and symbolic power', *Sociological Theory* (1989), **7**, 14–25. Also see G. Gadoffre, *La Révolution culturelle dans la France des humanistes*, Geneva, 1997.

46 P. Fabri, *Le Grant et vray art de pleine rethorique: util: proffitable et necessaire a toutes gens qui desirent a bien elegantement parler et escripre … Par lequel ung chuscun en le lysant pourra facillement et aornement composer et faire toutes descriptions en prose: come oraisons: lettres missives: epistres: sermons recitz: collations et requestes*, Rouen, 1534; also published in facsimile with an introduction by A. Héron, 2 vols., Rouen, 1890, i, 15. See also T. Reiss, *Knowledge, Discovery and Imagination in Early Modern Europe: The Rise of Aesthetic Rationalism*, Cambridge, 1997, 55–6.

47 Fabri, op. cit. (46), 9.

48 Fabri, op. cit. (46), 7.

49 Fabri, op. cit. (46), 13.

50 The measure of their success can perhaps be gauged by François I's 1539 edict of Villers-Cotterêts, which stipulated that French be the official language of the courts and in the administration of justice throughout the land.

51 Something that was clearly a priority, as Crignon's journal of Parmentier's voyage to Sumatra indicates: 'un matin, notre capitaine se delibera de l'aller voir, et mena seulement avec luy Nicolas Bout, le truchement, et moy'. Parmentier asked them if they knew how 'Dieu avoit envoyé son Verbe divin se faire chair en terre et s'incarner en une vierge par l'operation du Saint-Esprit: et comment ce Verbe, que est le fils, est engendré du Pere, ainsi que la parole est engendrée au coeur et en la pensée de l'homme; et que le Saint-Espirt procede du Pere et du Fils, qui est l'amour des deux. Notre truchement dit qu'il ne sçavoit dire cela. Il luy demanda s'il avoit our parler de Jesus et de la Vierge marie, il dit que ouy: et pour ce que le truchement ne pouvoit bien parler de ces choses, le propos fut changé.' See *Le Discours de la navigation*, op. cit. (27), 70.

thus an instrument of God's benign will. By helping to make voyages across the seas possible the astrolabe also made possible the extension of God's Word across the earth, thus fulfilling one of the preconditions for the prophesied end of the world and the thousand-year reign of Christ on earth.[52] As such the sphere of the astrolabe was not only a mirror of the heavens formed in God's own hand, but, as the guiding hand of the mother of God, a means of transporting all humanity from this world to the next. One would be transported to 'a port of grace', to paradise – as Crignon put it, to 'the year in which wars and all quarrels end' (*L'an où prend fin la guerre et toutz desbatz*).[53] This was so not only figuratively, insofar as Crignon's poetic astrolabe could be construed as a meditative device that could be used to focus a supplicant's attention, through contemplation of the mathematical instrument, on the Virgin's redemptive promise.[54] It was also to be construed literally, as a tool to navigate the worldly seas. Crignon wrote in the conclusion to his poem (see Appendix, item I), comparing the astrolabe to the Virgin,

> Prince, the people had then certitude
> Of the port of grace and her longitude.
> And the pilot, suspending the astrolabe from his finger,
> Said: 'Children, have no fear, I see
> The rays of the true sun break clear.
> This is the instrument that will ensure our safe conduct;
> The proof of which is in the using, and now I am sure,
> Just astrolabe where the sphere is comprised'.[55]

Knights and inscriptions

In the sixteenth century the planispheric astrolabe was an emblem of both mathematical and worldly power. Identified by John Blagrave in 1585 as the 'mathematical jewel', it occupied a privileged status in the cabinets of kings, princes and nobles across Europe.[56] This owed as much to the intricate complexity and precious materials of its crafting as to its astrological uses, positing a close interweaving of earthly and celestial power. There is no reason to think that this was not also the case when Crignon was composing his chant. Seen from this angle, the conflation of the mariner's astrolabe with the

52 See *Jean Parmentier, Oeuvres poetiques*, op. cit. (15), 46–8.

53 *Jean Parmentier, Oeuvres poetiques*, op. cit. (15), 64, see also 27–9, 40–1, 46–8.

54 In this sense, Crignon's poetic astrolabe is perhaps similar to Charles de Bovelles's polyhedra; see P. M. Sanders, 'Charles de Bovelles's Treatise on the Regular Polyhedra (Paris, 1511)', *Annals of Science* (1984), **41**, 513–66.

55 *Jean Parmentier, Oeuvres poetiques*, op. cit. (15), 65.

56 J. Blagrave, *The Mathematical Ievvel: shewing the making, and most excellent vse of a singuler instrument so called: in that it performeth with wonderfull dexteritie, whatsoeuer is to be done, either by quadrant, ship, circle, cylinder, ring, dyall, horoscope, astrolabe, sphere, globe, or any such like heretofore deuised: … The vse of which iewel, is so aboundant and ample, that it leadeth any man practising thereon, the direct pathway … through the whole artes of astronomy, cosmography, … and briefely of whatsoeuer concerneth the globe or sphere …*, London, 1585.

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planispheric astrolabe aimed to translate the ability to navigate the physical world into the ability to navigate the social one. Yet this act of social distancing was also an act of epistemic displacement whereby the image of the heavens inscribed on the astrolabe's brass plates was also projected as a series of precise imaginary lines onto the globe, thus making possible the back-and-forth displacement of men, ships and cargo across the open seas. Thus Crignon recounts how God inscribed the astrolabe with the tropics, the equator, the azimuth and the almicanaratz with his 'error-free compass', and how this would allow poor merchant sailors to navigate safely on the 'vast and limitless seas'. By conceptualizing the earth's surface as a geometrical grid defined by angular distance relative to the heavens Crignon was also navigating an escape from local empirically based craft knowledge to a highly abstract 'universal' framework of transoceanic navigation.[57] So important was this mathematical projection that Crignon began his account of his many voyages with a detailed exposition of how the earth was to be inscribed with lines of latitude and longitude:

> In order better to understand lands and their relative locations and distances, we must know what constitutes the longitude and latitude of regions. According to cosmographers, longitude is reckoned from the meridian of the Canary Islands eastward along the equator until, the earth having been encompassed, the said meridian is again reached. According to modern navigation, as established by the Portuguese, this circle is divided into 360 degrees, each 17 leagues in length. This is true for the equinoctial as well as for the longitudinal line. Latitude refers to another imaginary circle, crossing at right angles the equinoctial line passing through the two poles, and encircling the earth … These lines of longitude or latitude extend over the surface of the earth – the latitude being determined from the elevation of the pole, or from the altitude of the sun; and the longitude by [the positions of] the moon and the fixed stars, or by the eclipses, or by even more subtle means unknown to many.[58]

This grid framework was far from imaginary. It had real practical effects in making overseas trade possible. In Aristotelian terms, it helped translate unpredictable contingencies (perceptions) experienced on the open seas into memories durably inscribed on vellum and brass, thus helping to transform voyages of exploration into normalized trade routes. Thus, on the morning of Tuesday 11 May, Crignon recounts that on his voyage to Sumatra some fifty men were made knights (*chevaliers*) for having passed beneath the equator (*passant sous l'equateur*). As was appropriate to the solemnity of this '*feste de chevalerie*', together they sang the Mass of the Blessed Virgin ('*la messe de Salve santa parens*'), and dined on albacore and bonito.[59] It was not only the earth that was inscribed with knowledge of the heavens, but, in chivalrous rites of passage, the men who sailed beneath them on the ocean seas.

57 See Ash, op. cit. (31), 90.

58 B. G. Hoffman, 'Account of a Voyage Conducted in 1529 to the New World, Africa, Madagascar, and Sumatra, Translated from the Italian, with Notes and Comments', *Ethnohistory* (1963), **10**, 1–31, 33–79, 11–12 (from an account by 'a great French sea captain from Dieppe' published by Ramusio in the third volume of his collection *Navigationi et Viaggi*, and generally attributed to Crignon). Crignon's reference to other 'subtle' means of finding longitude unknown to many is surely a reference to his own treatise, *Perle de Cosmographie*, 1534, now lost, that purported to have found a solution (through magnetic variation) of the problem of determining longitude at sea.

59 *Le Discours de la navigation*, op. cit. (27), 19.

Through these men, these knightly agents of translation, Heaven's inscriptions extended across the various and diverse inhabitants of the world. As Crignon said, the Tupinamba of Brazil, for example, are 'like a blank canvas to which a brush has not yet been applied and on which nothing has yet been drawn, or like a young colt which has not yet been broken in'.[60] In this case, the *tabula rasa* of the New World's naked savages was to be covered with Christ's redemptive words as written and spoken by Normandy's merchants and sailors in the name of the French king and in the language of proto-nationalist dynastic competition between France and Portugal:

> The Portuguese are fortunate that the King of France is so kind and polite to them, for if he wished to unleash the merchants of his country they would conquer the markets and friendship of the people of all the new countries in four or five years. They would do this with love and not by force and they would penetrate further into these lands than the Portuguese were able to do in fifty years ... If the Portuguese, who say that this land is theirs, had been good Christians and had held the name of God before their eyes instead of their profits, half of the said people would have become Christians by this time, for many among them wish to learn about God and are very humble. The Portuguese prevent them from coming to know our faith by every means and make them believe many things which are not good for them in order to keep them in ignorance.[61]

Crignon thus lent further legitimacy to practical mathematics, beyond appeals to utility, by plotting mathematics, exploration and trade along the axes of humanist linguistic virtuosity and Christian eschatology. He thus connected civic dimensions of humanism, the *vita activa*, to militant Catholic spirituality and to the social identities and professional activities of the merchant poets of the *Puy*. Not surprisingly, navigation and commerce, like the astrolabe, were poetically intertwined with an eschatological narrative of fall and redemption. As he explained in another of his contributions to the *Puy* (in the Appendix, item III):

> Once when humans lived in great pleasure
> In a place of peace and delectation,
> Neither cold nor heat could cause them harm.
> But falling amorous of every good,
> Proud desire of ardent affection
> Placed in their hearts through its subtle language
> To go to sea to take up navigation.
> In the orient where precious gold is to be found
> And through its profitable commerce
> Loaded with all manner of alluring goods
> To the great profit of all the public good.
>
> Humans hearing this vain boasting
> And therefore navigation undertook
> And put to sea bodies, goods, provisions and sustenance,
> Raised anchor and without delay
> They hoisted high lofty sails.
> The wind of pride like thunder and lightning

60 *Le Discours de la navigation*, op. cit. (27), 23.
61 *Le Discours de la navigation*, op. cit. (27), 24.

Carried them off with such violence
That it drove their ship to sundry places
Too far from God towards the Antarctic pole
Holding always with the wind to better find
To the great profit of all the public good.

And when they gained knowledge of land
Proud Atropos by mortal command
Showed them the results of his power,
Making their bodies putrefy
With signs of his infection
Even the strongest of this noble crew
From the noblest to the insignificant page.
Upon seeing this had been heedful
Of turning towards heaven's benevolence
This furious danger to avoid,
To the great profit of all the public good.

And despite waves of ignorance,
The jealous and obstinate winds,
Until the cape called good hope
They sailed to their salvation;
And while navigating by the elevation
Of the true sun, by whose shadow they steered,
So that they had come to a safe and beautiful place,
Where with a fair sky, clear and without mist,
They saw rise beneath the oblique horizon
The pole star with luminous rays,
To the great profit of all the public good.

This constellation has given assurance
To the navigators in distress
That they would soon arrive in the land of France
With joy and consolation
The sickly for comfort
Took the bread of life as a necessity
That gave them health and more;
They would drink the most gracious wine of love
Each man applied himself to praising god
And from the skies the virgin descended
To the great profit of all the public good.

Prince we will honour the courageous virgin,
Who preserved from deadly shipwrecks.
Navigators in perilous dangers;
We will sing her magnificent virtues,
For she has marvelously saved us
To the great profit of all the public good.[62]

62 BN, Ms. Fr. 379 fol 20(r-v)–21(r). I would like to thank Margot Wagner for her help and advice in translating this poem.

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As this poem makes clear, in the early modern period commerce was a sign of Man's fallen state, of hubris fuelled by the winds of pride, arrogance and greed. This is precisely why it was considered derogatory for a noble to stoop to trade. It was not simply because trade was a menial lower-class affair, but because it was understood in terms of epistemic and spiritual hierarchies that carefully distinguished between the high and the low, the mind and the body, God and the Devil, the eternal soul with its heavenly analogues and the corrupt contingencies of the material world.[63] Commerce was part of a sinful world. At the same time, Crignon's poem locates it within a narrative of redemption mediated by the power of the 'courageous Virgin'. The merchant humanists of Normandy – unlike the Portuguese, who according to Crignon looked only to profits and not to God – thus inflected their material interests in overseas trade and navigation in a spiritual direction so as to plot a course towards 'the great profit of all the public good'.

In a similar manner, Crignon's poetic confusion of the mariner's astrolabe with the planispheric astrolabe enabled him to intertwine his expertise in navigation and mathematics both with worldly (mercantile) power and with the very structure of the Christian cosmos. In another poem (Appendix, item IV) entitled *The Island Where the Earth Is Higher than the Heavens*, Crignon describes a paradise, found through divine cosmography and a 'steady astrolabe and compass', where the dreams of Normandy's merchants for success and profit would be infused with profound religious significance:

> The great captain and wise pilot
> Who will sketch the great cosmography,
> Considering the many perils and passages
> That the sea holds, fortifies his great ship,
> His sacred vessel made quick and strong
> With the gifts of glory in immortal virtue,
> To lead her [his ship] to an island
> Where she could earn one-hundredfold,
> By which he made the crew made joyful,
> For he promised with his map to reveal
> The island where the earth is higher than the heavens.
>
> On this island there is no wind or storm;
> The sea is temperate and serene,

63 Fear of epistemic derogation did not correlate chronologically with social derogation. To a certain extent it pre-dated it. Aristotelian strictures against *metabasis* found an analogue in the policing of disciplinary boundaries at precisely the time these boundaries were becoming more porous, for example from the fifteenth century with the incursion of humanist philology onto grounds jealously guarded by university-trained theologians. On the other hand, concern grew regarding noble derogation during a slightly later period, from the end of the sixteenth century, when the nobility were being assailed from below by wealthy merchants and robe officials entering their ranks. On derogation and mathematics in early modern Italy see M. Biagioli, 'The social status of Italian mathematicians, 1450–1600', *History of Science* (1989), **27**, 41–95. More generally, regarding derogation in early modern France, see, for example, G. Brunelle, 'Narrowing horizons: commerce and derogation in Normandy', in *Society and Institutions in Early Modern France* (ed. M. Holt), Athens, GA, 1991, 63–79; E. Dravasa, '*Vivre noblement*': *Recherche sur la dérogeance de noblesse du XIV^e^ au XVI^e^ siècles*, Bordeaux, 1965; G. Zeller, 'Une Notion de caractère historico-sociale: La Dérogeance', *Cahiers internationaux de sociologie* (1957), NS, **22**, 40–74.

No taxes or imposts are to be paid,
Azure, balms and spices abound,
As do rubies, sapphires and fine gems.
And precious gold of supernal value.
It is the land where eternal power
In human form desires to reign for all time,
For in this place is the glorious Jesus,
The heavenly empire, if we think about it right, is
The island where the earth is higher than the heavens.[64]

Crignon's wager, his bid to transform his recondite knowledge of practical mathematics into creditworthy expert knowledge, and thus to garner patronage, prestige and authority, depended on a fourfold linkage between practical mathematics, humanist poetics, worldly power and religion. Given the still fragile basis for their claims to social status, especially when compared to that of the old feudal nobility and the scholastic theologians of the universities, humanists such as Crignon and the civic elites whose patronage he sought legitimated their intellectual skills, their trading empires and their new-found position in elite society with reference to religious devotion.

Translations

Whether charted across unknown seas or well-established social hierarchies, early modern French mobility was reliant upon and mediated by expert knowledge and skill. With regard to the former, this knowledge might be instantiated in maps, instruments, ships and stars; with regard to the latter, in gestures, clothing, tableware, speech or the writing of poetry.[65] In both cases, practised familiarity with and expertise in navigational techniques and norms definitive of social status were the *sine qua non* of mobility. At the same time geographical and social mobility were also made possible by undercurrents of spiritual belief. Whether as pilgrimage or as crusade, geographical distance, commerce and colonization were subsumed into eschatological narratives of renewal, return and salvation. Similarly, insofar as the early modern social world was dominated by ideas of the Chain of Being, movement up the social ladder was also movement closer to God. Geographical and social mobility were thus translated into theology and vice versa. The astrolabe of Crignon's poetry demonstrates the symmetrical translation of mathematical expertise into instruments capable of guiding ships across the seas and of navigating humanity towards redemption. From a slightly altered perspective it embodied the means by which the cosmographers, navigators and pilots who guided these ships were translated into heroic spiritual athletes defending God and king in verse. From still further away, the poetic astrolabe can be seen as playing out a

64 BN, Ms. Fr. 379, fol 29(r)–30(v). Ferrand, in *Jean Parmentier, Oeuvres poetiques*, op. cit. (15), p. li, attributes this *chant* to Parmentier. But its placement in a series of *chants royaux* in BN, Ms. Fr. 379 by Crignon strongly suggests that this poem was authored by Crignon. It is so attributed in J. Nothnagle's collection of Crignon's works, *Pierre Crignon: Poète en prose et en vers*, Birmingham, AL, 1990, 81.

65 See, of course, N. Elias, *Power and Civility*, New York, 1982.

social gambit by translating the specialized craft knowledge of the navigator from a menial (quadrivial) form of expertise in practical mathematics first into poetry and then into politico-theological practice which intertwined practical mathematics, exploration, commerce and colonization. This final linkage constituted something of a pathway around the jealously guarded knowledge of university theologians. Anthony Turner has pointed out that the astrolabe symbolized the status and authority of the navigator and of the explorer. It embodied and conjoined their theoretical and practical knowledge, quite literally making it possible for the first time to navigate the open seas. By equating the astrolabe with the immaculately conceived Virgin, Crignon's *chant* can be interpreted as a means of endowing the maritime exploits of Normandy's merchants with the legitimacy of a spiritual quest.[66] At the same time, Crignon's poetry aimed to link navigation on the high seas not only with commercial profit but also with the authority and prestige associated with veneration for the Virgin. In attaching his mathematical knowledge to a ritual performance of verse, through the mediation of poetry and the status that it gave him, Crignon directly challenged those who would restrict access to Truth to those with formal university training in theology and natural philosophy.[67] The message of Crignon's poem thus closely resembles that of Oronce Finé, mathematics professor at the Collège Royale, when he argued in 1532 that mathematics participated in both natural and supernatural worlds and was the road to universal science – that is, to philosophy.[68] But Crignon's metrical translation of practical mathematics into verse aimed even higher up the early modern hierarchy of knowledge: beyond poetry, humanist learning and philosophy to theology, the queen of all sciences.

Crignon's poem thus articulates a missionary evangelism whose agents were to be Normandy's merchant humanists acting in the name of God, good business, the public

66 On Normandy's merchants see Mollat, op. cit. (16); and, for a slightly later period, G. Brunell, *The New World Merchants of Rouen, 1559–1630*, Kirksville, MO, 1991.

67 In 1542 the Sorbonne explicitly prohibited treatises of grammar, rhetoric, logic or *lettres humaines* from referring to Christian doctrine; see F. Higman, *Censorship and the Sorbonne: A Bibliographical Study of Books in French Censured by the Faculty of Theology of the University of Paris, 1520–1551*, Geneva, 1979, 50 and 52 n. 18. While it might be argued that the mixing of disciplinary genres such as poetry and mathematics violated the Aristotelian stricture against *metabasis*, from the fifteenth century there was a steady erosion of the lines demarcating these disciplines. Indeed, the skills, competencies and local cultures associated with the status mobility of new professional classes were deeply implicated in the blurring of and in translations across the frontiers between different sorts of knowledge claim. See R. Westman, 'The astronomer's role in the sixteenth century: a preliminary study', *History of Science* (1980), **18**, 105–47, 120; and especially A. Funkenstein, *Theology and the Scientific Imagination from the Middle Ages to the Seventeenth Century*, Princeton, 1986, 36–7, 303–7.

68 *Orontii Finei Delphinatis, Liberalium disciplinarum Professoris Regii, Protomathesis …*, Paris, 1532, fol. AA 2(r)–AA2(v), Ai (r), quoted in Davis, op. cit. (30), 30. Such a claim could be made by Finé, who was a reader at the Collège Royale, precisely because he was dependent for his professional identity not on the University of Paris but on the patronage of the king. The hierarchy of the disciplines at the University clearly distinguished between such menial mathematical pursuits and true knowledge; trespass across disciplines was strictly forbidden. However, at court, as Biagioli (see his *Galileo Courtier: The Practice of Science in the Culture of Absolutism*, Chicago, 1993) has shown for a later period, there was room to navigate across these divides. The career of Lefèvre d'Etaples was a case in point. The princely court was not the only vehicle for such discipline-bending activity, however; the court of Normandy's *Puys* provided similar opportunities.

good, the king and France. No longer were spiritual matters to be the sole purview of the doctors at the Sorbonne. Now poets, mathematicians, instrument-makers, merchants and navigators could have their say as well.[69] Thus Crignon's *chant* was not just a poem, but a tool. It was a means of forging links and alliances between his technical expertise in practical mathematics, his cultural skills as a poet, the mercantile interests of his fellow poets and the social legitimacy associated with a religious tradition of devotion to the Virgin Mary. His poetic astrolabe was not only a navigational tool, it was a spiritual device that was called upon to reveal and make evident the rational harmony imprinted upon the cosmos. It was also a rhetorical technology, a means to persuade his king that overseas exploration was a legitimate, honourable and worthy undertaking. Furthermore, it was an instrument of social mediation whereby Crignon could attach himself and his knowledge to the status of powerful merchants, civic leaders and courtiers. As Crignon's captain and friend, Jean Parmentier, wrote as he sailed towards his untimely death off the coast of Sumatra in 1529 (Appendix, item V),[70]

> … I have no money to put
> On the desk to have benefices;
> And without money, one has neither commissions nor letters of mark
> Unless one is shrewd enough to undertake
> A theft: by guile or by flattery.
> But I have had other propitious means
> To have honour, as have others,
> In acquiring the solemn round bonnet of a doctor at the University
>
> Because, it is the case that one takes for a good pilot,
> A sailor, whose skill all have recognized,
> Who is understood to be well practised,
> And who has known his profession for a long while,
> Indeed so perfectly that he never fails by so much as an iota,
> As a doctor not of the university.
> Am I then filled with such uncertainty
> To have elected seafaring to study,
> To leave the gentle for rude?
>
> Consider what doctor I would have been,
> And where my honour and grave majesty would appear!
> *Instead, I am poor and dejected,*
> *A Sailor without authority*
> *Except when in danger while on the sea!*

69 Crignon's poem was nothing less than an audacious intervention in the well-known controversy over the Virgin's Immaculate Conception by a lowly provincial navigator. As such, his poem was a direct challenge to traditional hierarchies of both knowledge and authority. On the controversies over the Immaculate Conception of the Virgin see E. D. O'Connor (ed.), *The Dogma of the Immaculate Conception*, Notre Dame, 1958.

70 See J. Nothnagle, 'Two early French voyages to Sumatra', *Sixteenth Century Journal* (1988), **19**, 97–107; L. Estancelin, *Recherches sur les voyages et découvertes des navigateurs normands en Afrique, dans les Indes orientales et en Amérique, suivies du Journal de voyage de Jean Parmentier de Dieppe à l'Isle de Sumatra, en l'année 1529*, Paris, 1832.

But on land, one would say to me: 'Our Master,
Bona dïes, your beautiful words, by Saint Gille,
Are as true as the beautiful Gospel!'[71]

The astrolabe here occupying centre stage was not an instrument made in metal, but one forged of beautiful words. It was as poetry that the linkage between mathematics, society and theology was made and Crignon's wager forged.

Appendix: original texts of verses

I *Jean Parmentier, Oeuvres poetiques* (ed. F. Ferrand), Geneva, 1971, 62–5

Juste astrolabe où la sphere est comprise,
Nostre astrolabe où la sphere est comprise,
c'est l'humble Vierge en sa conceptïon,
l'ouvrier, c'est Dieu, qui grace lui confere,
pour de son filz faire reception.
La ligne aurore est son inceptïon,
le cercle rondz et graduacïon,
ce sont vertus que Dieu en elle infere.
L'equateur est justificatïon,
tropiques sont gloire, exaltacïon
dont toute vierge, en honneur, el prefere.
Le zodïac et la retz stillifere,
dons de beaulté et de perfectïon,
les angles droiz, la benedcïon
du Tout-Puissant qui la garde et soustient,
qui la faict just à son intentïon
pour contenir, soubz son extentïon,
le rond parfaict qui l'enclost et contient.

Celuy qui fit la grande mapemonde
bien compassée en zones et climatz,
voyant humains en la mer de ce monde
hors de leur routte, en perilz vains et matz,
ayant perdu ancres, voilles et matz,
pour la tempeste et vent d'ingratitude,
non congoissans soubz quelle latitude
estoient menéz, navigans en desroy,
leur compassa du plus fin or qu'on prise,
pour les conduire en sain et bon terroy,
just astrolabe où la sphere est comprise.

Il la tourna et fist de forme ronde,
puis gradua le limbe par compas.
De purité fut la face profonde

71 *Jean Parmentier, Oeuvres poetiques*, op. cit. (15), 94–5. I would like to thank Hélène Mialet for her help and advice with this translation (my emphasis).

pour recepvoir tables où ne sont pas
traictz maculéz, car sans faillir d'un pas,
quatre angles droictz y feist en promptitude,
luy conferant de beaulté plenitude.
Chacun tropique y fut mis en arroy
et l'equateur justement, sans reprise,
pour l'approuver comme instrument de roy,
juste astrolabe où la phere est comprise.

Sur les tympans tournéz d'or pur et munde,
dont la beaulté surpasse humains caractz,
de son compas fit, sans rasure immonde,
les azimus et almicantaratz,
la ligne aurore exempte de baratz,
le droict zenith d'humble mansuetude,
horisons vrays, heures de rectitude;
puys mist dessus la retz portant en soy
le zodïacq d'estoilles entreprise,
et l'ostenseur qui le monstre, par loy,
just astrolabe où la phere est comprise.

De l'aultre part, maynte orbe la circonde,
où sont pourtraictz, par degretz haultz et bas,
signes d'amours, jours et moys, où se fonde
l'an où prend fin la guerre et toutz desbatz.
Puis l'alidade y a mis, par esbatz,
pour demonstrer aux quartes d'altitude
du vray soleil la haulte magnitude
quand il viendra, par la ligne de foy,
entrer dendens la pinulle bien prise.
Et lors sera trouvé, comme je croy,
just astrolabe où la phere est comprise.

De l'alchitoth où charité habonde
fut tout conjoinct, dont pauvres humains las,
voyans la sphere en la grand mer feconde
estre comprise eurent joye et soulas
et de la mort eviterent les lacz,
considerans, soubz tel similitude,
que Vierge et mere, en toute sainctitude,
contiendroit Dieu et que, par son octroy,
seroit de grace en concept si eprise
qu'on la diroit hardiment, sans effroy,
juste astrolabe où la sphere est comprise.

Prince, les gentz eurent lors certitude
du port de grace et de sa longitude.
Et le pillote, ayant l'armille au doygt,
disoit: «Enfantz, n'ayez craincte, je voy
du vray soleil le clair rayon qui brise.
Cest instrument nous fera bon convoy;

en l'esprouvant maintenant le congnoy,
juste astrolabe où la phere est compirse.»

II From *Jean Parmentier, Oeuvres poetiques* (ed. F. Ferrand), Geneva, 1971, 25

Le vent arriere, il suyt du North l'estoille,
la chart au poing, se conduysant par elle
soubz le zenith de son propre hemispere,
en compassant, en ligne parallelle,
la mapemonde aux humains salutaire.
A ce routtier que par dimensïon
mers traversoit, son estoille recline
tant qu'il convient, pour l'elevatïon
du polle voir, que l'astralabe incline.
mais les haulteurs du plaustre concellées
apperceust lors, ses clartéz reculées
par retrograd, en quadrature telle
que le routtier ne scayt art ou cautelle
pour pyloter, fors que tousjours espere
que de lueur luy donnera scintelle
la mapemonde aux humains salutaire.

III BN Ms. Fr. 379 fol. 20(r-v)–21(r)

Au temps que humains vivoient en grand plaisir
Au lieu de paix et de dilection
Que froid ou chauld ne leur faisoit nuysance.
Mais de tous biens avoient amplexion
Lhaultain vouloir de ardante affection
Leur mist au cueur par son subtil langage
De entrer sur mer pour faire ung navigage.
En lorient ou croist lor precieux
Et que au moyen de sa bonne traffique
Ilz chargeroient de tous biens specieux
Au grand proffit de tout le bien publique.

Humains oyantz ceste vaine iactance
Ont entreprins la navigation
Et mis sur mer corps biens vivres substance
Levent leur anchre et sans dilation
Ont guinde hault voiles de elation
Le vent dorgueil comme fouldre et orage
Sest mis dedens soufflant par tel oultrage
Quil a poulse leur nef en divers lieux
Trop loing de dieu vers le pole antartique
Tenant au vent tousiours pour trouver myeulx
Au grand proffit de tout le bien publique.

Lors quilz ont eu de terre congnoissance
Fiere Atropos par mortelle action

Leur a monstre leffect de sa puissance
Mettant leur corps a putrefaction
En maculant de son infection
Tous les plus fortz de ce noble equippage
Depuis le grand iusques au petit page.
Dont ce voyant ont este curieux
De retourner vers la bonte celique
Pour eviter ce danger furieux
Au grand proffit de tout le bien publique.

Et non obstant les vagues dignorance
Le vent denvie et de obstination
Iusques au cap dict de bonne esperance
Ont capie pour leur salvation
Et tant single soubz lelevation
Du vray soleil dont ilz voyent lumbrage
Quilz sont venus en seur et beau parage
Ou dung beau temps cler et non bruyneux
Ont veu nasquir soubz lorison oblique
Lastre polaire aux rayons lumineux
Au grand proffit de tout le bien publique.

Ceste sydere a donne asseurance
Aux navigantz en tribulation
Quilz parviendront tost en la terre france
En grand leesse et consolation
Du maladifs par recreation
Prendront le pain de vie pour usage
Qui leur donra sante et davantage
Bevront le vin damour tout gracieux
Parquoy chascun a louer dieu se applique
La vierge aussi descendue des cieulx
Au grand proffit de tout le bien publique.

Prince honnorons la vierge de courage,
Qui preserve a de mortel nauffrage.
Les navigantz en dangers perilleux
Elucidons sa vertu magnifique
Car elle a faict ung salut merveilleux
Au grand proffit de tout le bien publique.

IV BN, Ms. Fr. 379 fol. 29(r)–30(v)

Le grand patron et pilote tressage
Qui composa la grand cosmographie,
Considerant maint peril et passage
Qui sont en mer, sa grand nef fortifie
Ses bortz sacrez renforce et vivifie
Des dons de gloire en vertu immortelle
Pour la mener dedans une isle telle
Que elle y pourra a cent doubles gaigner,

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Dont il a faict l'esquipage joyeux,
Car il promet par sa carte enseigner
Lisle ou la terre est plus hault que les cieulx.

Dedens ceste isle il ne faict vent ne orage,
La mer y est temperee et serie,
Payer ny fault coustume ne truage,
Azur y croist, basme, et epicerie,
Rubys, saphirs, et fine pierrerie,
Or precieux de valeur supernelle.
Cest le pays ou puissance eternelle
En corps humain veult en tout temps regner,
Dont se en ce lieu est jesus glorieux,
Le ciel empire est a bien raisonner
L'isle où la terre est plus hault que les cieulx.

V From *Jean Parmentier, Oeuvres poetiques* (ed. F. Ferrand), Geneva, 1971, 94–5

… je n'ay argent à mettre
sur le bureau, pour avoir benefices;
et sans argent, on n'a bulle ne lettre
s'on n'est subtil pour s'entremettre
d'en crocheter, par dol ou par blandices.
Mais je eusse eu aultres moyens propices
d'avoir honneur, comme les aultres ont,
en acquerant le grave bonnet rond.

Or, pour certain on tient qu'un bon pillotte,
un marinier, qui tout son cas bien note,
bien entendu et bien exercité,
est plus long temps pour entendre sa note,
parfaictement qu'il ne s'en faille ïote,
que un docteur n'est en l'université.
suis je pas donc bien plein de cecité
d'avoir eleu le maritime estude,
laissant le doulx pour emporter le rude?

Considerés quel docteur je eusse esté,
en quel honneur ma grave majesté
pesantement on eust veu apparoistre!
Et en lieu, suis un povre dejeté,
un mathelot qui n'a auctorité
fors qu'en la mer, quant au danger fault estre!
Mais en la terre, on m'eust dict: «*Nostre maistre,*
bonna dïes, vos beaulx mots, par Sainct Gille,
sont aussi vrays que la belle evangile!»

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