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THOMAS HARRIOT ON COMBINATIONS

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Abstract. — Thomas Harriot (1560?–1621) is known today as an innovative mathematician and a natural philosopher with wide intellectual horizons. This paper will look at his interest in combinations in three contexts: language (anagrams), natural philosophy (the question of atomism) and mathematics (number theory), in order to assess where to situate him in respect of three current historiographical debates: 1) whether there existed in the late Renaissance two opposed mentalities, the occult and the scientific; 2) whether all mathematical science was clearly demarcated from natural philosophy at that time; and 3) whether all enquiry into nature (including that pursued through mathematics) entailed a consideration of the attributes of God Himself. The paper argues from the case of Harriot that as a man capable of highly abstract mathematical thought, his work on combinations of all kinds is scarcely marked at all by the social, political and religious context from which it arose (which is not to say that his work on alchemy or on practical mathematics is unmarked in the same way), and that he, like many of his contemporaries, was capable of compartmentalising his mind, and of according different modes and degrees of intellectual commitment to different areas of his mental universe.

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Résumé (Les combinaisons chez Thomas Harriot). — Thomas Harriot (1560?–1621) est célèbre pour ses travaux novateurs tant dans le domaine de l'algèbre que de la philosophie naturelle. Dans cet article, on se propose d'examiner sa pensée sur les combinaisons dans trois contextes ; celui du langage (les anagrammes), celui de la philosophie naturelle (les atomes) et celui de la théorie des nombres. On considérera cette pensée dans le cadre de trois débats historiographiques, à savoir : 1) si ou non, il existe deux mentalités opposées au seuil de la modernité, à savoir l'occulte et la scientifique ; 2) si à cette époque les « sciences mathématiques » sont distinctes de la philosophie naturelle ; et 3) si cette philosophie comprend, au-delà d'une étude de la nature elle-même, celle des attributs du créateur de la nature. Du cas Harriot, on concluera que ce mathématicien est capable d'une pensée mathématique fort abstraite, libérée de l'idéologie sociale, religieuse et politique de son temps (sans que ce contrat s'étende à ce qu'il a à dire sur l'alchimie, ou sur les problèmes des mathématiques appliquées, comme celui de la longitude), et qu'il est capable, comme bien de ses contemporains, de compartimenter son esprit de façon à s'engager mentalement selon des modes fort divers dans les différents domaines de son univers intellectuel.

1. INTRODUCTION

Thomas Harriot (1560–1621) is known today as an elegant and innovative mathematician, a natural philosopher and astronomer, a traveller to the New World, on which he published, and a member of the Northumberland circle with wide intellectual horizons. This paper will look at his interest in combinations in three contexts: language, natural philosophy (the question of atomism) and mathematics, in order to assess where to situate him in the range of occult and scientific mentalities associated with the late Renaissance. At his death in 1621, he left many pages of mathematical workings and drafts, but relatively little discursive prose; this fact has been linked to the privacy with which he surrounded his work, and his notorious reluctance to publish his discoveries.[1] Hilary Gatti has even gone so far as to suggest that his use of symbols and diagrams in his manuscripts reflects a "distrust of words" [Gatti 1999, p. 66]. Whether or not this is the case, it means that much has to be made out of a few not always legible gnomic sentences; these are often subject to almost contradictory readings according to the context in which they are placed.

[1] See Sir Thomas Lower's letter to Harriot dated 6 February 1609/10, quoted by Batho [1999b, p. 286]. I should like to thank Juliet Fleming, Ruedi Imbach, Sachiko Kusukawa, Isabelle Pantin and Jackie Stedall for their bibliographical help.

I shall give one example of this here, as a way of introducing the interpretative problems which this paper will address: it is a passage from the letter Harriot wrote in 1615 to his physician Théodore Turquet de Mayerne (1573–1655). After a recital of his symptoms (consistent with a cancer induced by smoking, which he had acquired as a habit while in the New World), he writes:

> "Think of me as your most affectionate friend. Your interests therefore are as mine. My health will be your glory too, but through the Omnipotent who is the author of all good things. As I have said from time to time, I believe in three things. I believe in one almighty God; I believe in the art of medicine as ordained by Him; I believe in the physician as His minister. My faith is sure, my hope is firm. I wait patiently for everything, in its own time, according to His providence. Let us act resolutely, battle strenuously, and we shall win. The world's glory passes away. Everything will pass away; we shall pass, you will pass, they will pass. I wrote to your apothecary for the pills. Perhaps I will receive one dose before Advent".[2]

As Hugh Trevor Roper [1999] notes, this is a strange passage to find in a letter to one's physician, and it invites comment. Mayerne, as is well known, was a Montpellier-trained doctor who was sympathetic to Paracelsian ideas. Two contexts occur to me which might throw some light on the sense to be attributed to the passage. The former is the following statement by Jean Hucher (d. 1603), Mayerne's colleague when he was at Montpellier, that:

> "The most high and great God, the lord of all of nature, freely administers, impels, hastens, delays, hinders or altogether prohibits the forces, actions and effects of nature [...] therefore Aristotle's disputations about chance and fortune as two unknown efficient causes are rightly laughed off the stage by pious men, for God is alone the author of all spontaneous events and their contingency".[3]

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[2] British Library (hereafter BL) Add. MS 6789, f. 446v (letter to Théodore Turquet de Mayerne, 1615): "*cogita de me tanquam tui amantissimo. Tua res igitur* (Scott Mandelbrote [1999, p. 247], reads "*auspicat*") *sicut et mea. Mea salus erit etiam tua gloria sed per omnipotentem qui omnium bonorum est author. Ut aliquando Dixi, tripliciter credo. Credo in Deum omnipotentem Credo medicinam ab illo ordinatam, Credo medico tanquam illius ministro. Fides mea certa spes firma. Expecto tamen cum patienta omnia suis temporibus* [Harriot adds "*suo tempore*" as an alternative above these words] *secundum illius providentiam. Agendum serio, pugnandum strenue, sed eius nomine, et vincemus. Sic transit gloria mundi. Omnia transibunt, nos ibimus, ibitis, ibunt. Scripsi ad tuum pharmocopaeum pro pillulis fortasse unam dosim capiam ante adventum.*" On Turquet de Mayerne, see [Nance 2001].

[3] Hucher [1602, sig. ** 6v]: "*Deus optimus maximus totius naturae dominus, vires actiones et effectus eiusdem libere administrat, impellit, urget, tardat, interpellet aut omnino prohibet... Merito igitur Aristotelis de casu et fortuna tanquam effectricibus duabus causis ignotis, disputationes a piis*

This might suggest that the Harriot, who was "waiting patiently for everything, in its own time, according to God's providence", concurred in a Montpellerian belief that the doctors are no more than vehicles through whom divine will is implemented (a view consistent with Paracelsianism, and implicitly hostile to the claims of rational Galenic medicine).[4]

The second context comes from a book published in the same year as Harriot's letter by the physician and proto-chemist Andreas Libavius (1550–1616) entitled the *Examination of the new [*Paracelsian*] philosophy, which is opposed to the old and seeks to abrogate it*; Harriot owned at least one of Libavius's other works (a pamphlet against the Rosicrucians), and it is possible that he knew this one. In it, Libavius argues that to philosophize in a Christian way is to follow Aristotle, not magic, cabbalah, alchemy, astrology, chiromancy, or, of course Paracelsus; that conventional Aristotelianism represents the order of God; and that rational medicine (as opposed to Paracelsianism), which looks upon itself as the "minister and corrector of nature", is a gift of God.[5] The similarity in terms and sentiment with Harriot's letter is pretty clear, but its implication is the opposite of the meaning which can be derived from a comparison with the Hucher text. I do not doubt that Harriot was writing to please Mayerne, but it is difficult to know what he was trying to say: the first of my contexts would suggest that Harriot was recognizing the Paracelsian mission of his physician as a passive channel of God's grace, and the second that he was stressing his active ministry. I shall return to this choice of interpretations at the end of this paper, in the context of Harriot's religious beliefs. Before that, I shall place some other enigmatic or elliptical of Harriot's comments in contexts: mainly drawn from continental writers quoted by Harriot himself, such as the mathematician Michael Stifel (1487–1567) and the polymath Girolamo Cardano (1501–1576).

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viris exploduntur; cum omnium spontaneorum casuum solus Deus sit author, eorumque contingentiae." For Melanchthon's view of this problem, see [Kusukawa 1993].

[4] See [Maclean 2001, pp. 87–90].

[5] Libavius [1615, p. 298]: "*ordo Dei est Philosophia quae docetur in Gymnasiis, Scholis, et Academiis, ut et Theologia syncera declarata Augustanae Confessione. Dei donum est medicina dogmatica et aliae artes scientiaeque.*" On Harriot's possession of another of Libavius's works, see [Mandelbrote 1999, p. 252]. For the views of a Paracelsian, see [Kahn 2004].

2. HISTORIOGRAPHICAL DEBATES

Three recent debates in the historiography of science are relevant to this article. The first of these concerns the thesis that there are separate "scientific" and "occult" mentalities in the late Renaissance. The latter mentality has been dubbed by W.B. Ashworth, Jnr, the "emblematic world view", according to which the book of nature was believed to be written not, as Galileo was to aver, in the language of mathematics, but in an intricate metaphorical discourse of symbols and emblems whose decoding yielded understanding of the meaning of the cosmos and of human existence.[6] In the recent anthology of essays edited by Robert Fox, entitled *Thomas Harriot: an Elizabethan man of science*, some bracingly different views on this very issue are juxtaposed. The "occult" or "emblematic" view owes much to Frances Yates and the discovery she claimed to have made of an elite Christian neo-Platonic humanist intelligentsia in England in the latter years of the sixteenth century, interested in natural magic and humanity's future; one may take as the antipode of this view the claim that at the same time there are thinkers with a scientific outlook struggling to break free from "backward Renaissance thinking". Naturally, a number of intermediate or variant opinions are also expressed: according to one, Harriot was not an orthodox Christian but an atheist in the sixteenth-century sense of that term; or he was a humanist and atomist beguiled by Giordano Bruno's neo-Platonic hermetic vitalist version of this doctrine; or again, he was "scientific in one sense but still linked to animistic precepts of Renaissance magic, alchemy and the regrettable concomitant Hermetic traditions of secrecy and concealment" (the view of Charles Nicholl and to some degree J.W. Shirley); or yet again, the claim made by Stephen Clucas [1999] that the dichotomy between scientific and occult comes out of a modern mind-set, and is inappropriately applied to Elizabethan thinkers. A further possibility not there considered is that the dichotomy can indeed be applied to these thinkers, but that their commitment to one or the other side is intermittent, or determined by the matter in hand.

The debate is seen most starkly in the opposition between the figure of Harriot the natural philosopher and Christian on the one hand, and

[6] [Ashworth 1990]. See also [Vickers 1984].