

Chaucer's *Treatise on the Astrolabe*: A Handbook for the Medieval Child

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Chaucer's *Treatise on the Astrolabe* is seldom read nowadays except by the most conscientious student, then reluctantly; and for good reason: forbiddingly technical, the *Treatise* reflects little of the doctrinal "earnest" or winsome "game" for which Chaucer is admired. But, however ominous its subject matter, the *Astrolabe* is significant in the literary canon of the Middle Ages, for it is one of the few extant works written specifically for a child. This "litel tretys," the author tells us, was undertaken at the "besy praier" of his ten year old son Lewis. The child's eager opportuning and Chaucer's evident pride in his son's "abilite to lerne sciences touching nombres and proporciouns" allow the reader a rather uncharacteristic glimpse of the poet in a domestic moment. While historical records and his own poetry have familiarized us with Chaucer as a man of civil affairs, diplomatic confidant to the court, and literary entrepreneur, the *Astrolabe* discovers Chaucer the parent, one whose desire to instruct his son in the skills of the adult world warrants our attention in a very special way. Traditionally, social historians have rejected the notion that there existed in the Middle Ages either a concept of the child or a concomitant theory of his education. In his *Centuries of Childhood*, Philippe Aries, for example, notes that not until the fifteenth century does there appear an awareness of the special nature of the child and an educative process suitable to his condition. We have then, according to Professor Aries, "a change corresponding to a desire, new as yet, to adapt the master's teaching to the student's level. The desire to bring education within the pupil's understanding was in direct opposition not only to the medieval methods . . . but also to humanist pedagogy which made no distinction between child and man. . . ." ¹ The *Treatise on the Astrolabe* belies both the date and the attitude, for within its brief compass there emerges a consistent, thoughtfully conceived, and humanely executed principle of instruction which attests not only Chaucer's awareness of his son as a child but also his concern for an appropriate pedagogical discipline.

Because the formal study of astronomy or its undifferentiated medieval synonym "astrology" was reserved for older students, Chaucer was wary that complicated equipment or murky abstractions might well dampen his son's fledgling interest. He consequently scales his program of instruction to the abilities and desires of young Lewis. Like the astrolabe Chaucer provides his son—one "so small" as to be "portatif aboute," this "litel tretys" is similarly manageable: its conclusions, drawn "under full light reules" in "light English," are not "to harde to thy tendir age of ten yeer to conceyve." But, for all the diminutives, there is no hint of condescension. The astrolabe is, after all, "noble," "suffisant" for "oure orizonte." So, too, the manual, "rude" though it may be, rehearses problems which are nonetheless "trewe," their inferences "subtile" enough to explore the outer limits of Lewis' intellectual horizon. With characteristic modesty, indeed the kind of self-effacing diffidence which recalls the poet-narrator of the *Canterbury Tales*, the father assures young Lewis that this treatise

is not of his own making: “I n’am but a lewd compiler of the labour of olde astrologiens, and have it translaid in myn Englissh oonly for thy doctrine.”² That Chaucer translated his treatise in large part from the extant *Compositio et Operatio Astrolabii* of Messahala, an Egyptian astronomer of the eighth century, has been well established. In fact, as has been frequently noted, Chaucer follows Messahala’s organizational scheme rather closely, beginning, like the Latin original, with a description of the astrolabe, its workings and capabilities, and concluding with a series of practical problems of graduated difficulty in its operation. But Chaucer’s treatise is by no means a slavish rendering. Therein lies its importance. On the one hand, the collation of the two texts serves to illustrate Chaucer’s mode of adapting his source to the needs of a ten year old; on the other, while Chaucer never explicitly defines his concept of childhood, implicit in his adaptation are certain fundamental attitudes about children, their formative experience, and the literature which underpins that experience.

Since Lewis’ Latin is “yit but small,” the primary modification Chaucer makes for his young pupil is to render Messahala into the boy’s native language. What is particularly striking in this regard is that Chaucer’s translation seldom betrays its Latin source. Couching his language in the “light Englissh” of his son’s idiom, Chaucer rarely lapses into easy cognates and, as the following examples testify, painstakingly avoids Latinity in favor of the “naked words” of Lewis’ vernacular:³

halve circles (554:16)	semicirculos (175:13)
loke (557:30)	considerare (185:35)
heyghte (561:41)	altitudinis (190:46)
in the same wise (558:33)	similiter (176:17)
which day is lik to which day (553:15)	equalis (175:15)
stremes of the sonne (550:2)	radius solis (218:27)
shine thorough bothe holes of thi rewle (550:2)	transeat (170:2)
wote (550:8)	computato (225:29)

Similarly, where Messahala’s penchant for abstraction might well tax Lewis’ elementary scientific background, Chaucer replaces the abstruse with a visual specificity befitting his son’s level of comprehension: Messahala’s rather hazy “rei accessibilis” is made concrete in Chaucer’s version as “the tower”; “solsticium hyemale” becomes “the lowest point where the sonne goth in wynter”; “altitudinem medie,” the “highest of the sonne in the mydde of the day.” In fact, Lewis’ native experience controls Chaucer’s exposition: the father domesticates the fussy erudition of the expert to the child’s homelier vocabulary. Thus, the “reet” of the astrolabe, a perforated plate which represents the heavens, is described as “shaped in manere of a nett or of a webbe of a loppe [spider]” (546:3). The pin which joins the several plates of the instrument is in “manere of an extre [axeltree]” (548:14). So, too, the network of coordinates radiating out from the center of the astrolabe are “croked strikes [flax sheaves] like to the clawes of a loppe, or elles like the werk of a wommans calle [hair net]” (548:19).

But Chaucer’s adaptation goes well beyond the concerns of an intelligible vocabulary, for his syntax as well manifests his intention to spare Lewis the necessity of having to ravel the convolutions of Messahala’s periodic style. Excusing himself for the “rude endityng” and “superfluite of wordes” which characterize his translation, Chaucer

explains that both are necessary because “curious endityng and hard sentence is ful hevvy at onys for such a child to lerne.” Thus, at every turn, Chaucer naturalizes the Latinate periods of Messahala into a syntactical collocation which is at once more colloquial and homespun. A few brief examples should suffice. In his description of the computation of the sun’s altitude, Messahala characteristically organizes his material around a series of subordinating conjunctions:

When you want to know the altitude of the sun, hang the astrolabe by its ring from your right hand, and with your left side turned towards the sun, raise or lower the rule, until a ray of the sun traverses the holes of both sight vanes. . . . But if you want to know the exact time and also the ascendant, set the degree of the sun upon the almucantherath of its altitude, on the side of the east, if the altitude was taken before noon; or on the side of the west, if the altitude was taken after midday; then the hour upon which the nadir of the degree of the sun will have fallen will be the present hour, and the Sign which was on the east side of the horizon is rising, that is ascending; and that which is on the western side is setting. (Gunther, p. 170)

Recognizing the difficulty for a child to trace the intricate causal and temporal relationships which subordination entails, Chaucer structures his version around a compressed succession of independent members, each introduced by the simple coordinate *and*, each describing a discrete step in the welter of requisite manipulations: “Put the ryng of thyn Astrelabie upon thy right thombe, and turne thi lift side ageyn the light of the sonne; and remewe thy rewle up and doun til that the stremes of the sonne shine thourgh bothe holes of thi rewle. Loke than how many degrees thy rule is areised fro the litel crois upon thin est lyne, and tak there the altitude of thi sonne” (550:2).

That is not to say, of course, that Chaucer’s treatise is entirely devoid of complex syntactical structures, for some fifty percent of his sentences contain dependent clauses (as compared to eighty percent in Messahala). However, where Chaucer does subordinate material which is of secondary importance, he relies largely upon the natural junctures of sentence order rather than semantic or even morphemic cues. For example, as Chaucer describes the pin which joins the several plates of the astrolabe, he abuts idea to idea in a compact series of relative clauses. What emerges, however, is not so much a precisely delineated construct of interdependent syntactical parts, but a progression of coordinate elements, curiously independent, which are linked together in almost paratactic fashion: “Than is there a large pyn in manere of an extre, that goth thourgh the hole that halt the tables of the clymates and the riet in the wombe of the moder; thourgh which pyn ther goth a litel wegge, which that is clepid the hors, that streynith all these parties to-hepe” (547:14). Similarly, in his description of the “moder,” the main informational plate of the astrolabe, Chaucer avoids the periodicity which inheres in a succession of relative clauses by arranging them as parallel independent statements: “This moder is dividid on the bakhalf with a lyne that cometh descending fro the ring doun to the netherist bordure. The whiche lyne, fro the forseide ring unto the centre of the large hool amidde, is clepid the south lyne, or ellis the lyne meridional. . . . Overthwart this forseide longe lyne ther crossith him another lyne of the

same lengthe from eest to west. Of the whiche lyne, from a litel cross in the bordure unto the centre of the large hool, is clepid the est lyne, or ellis the lyne orientale” (546:4-5). The stylistic effect is apparent. Chaucer’s preference for parataxes, the relative absence of causal and temporal connectives, indeed his insistence upon a sequential arrangement which focuses upon each detail in turn by a kind of incremental delineation, reinforce the impression of the writer’s forbearance, his humane desire to clear away the tangle of Messahala’s “curious endityng” and “hard sentence.”

As might be expected, Messahala’s treatise, intended as it is for older students, reflects little concern for pedagogical technique. Dense with the minutiae suitable to advanced study, Messahala’s tract is marked by a method of presentation which is terse if not downright perfunctory. Once given, a general principle is assumed to be mastered, its implications readily inferred, and its practical applications obvious. Chaucer makes no such assumptions. His is not the expert’s enthusiasm for comprehensiveness. Rather, as he points out in his introduction, this treatise proposes to “teche” only a “certein nombre of conclusiouns.” He pares away those problems which are either inappropriate to Lewis’ portable instrument or too advanced for his “tendir” comprehension. Thus, of the forty-seven sections which comprise the *Compositio et Operatio Astrolabii*, only twenty-six correspond to the Englished version. Moreover, within the sections adopted from Messahala, Chaucer focuses solely upon details that are relevant to the novice’s level of understanding. For example, in his discussion of the computation of the “Motion of the Sun and the Day and the Month,” Messahala includes a welter of tangential information: “When you wish to know the degree of the sun, set the alidade upon the day of the present month; then the degree touched by its tip will be the degree of the sun. Look to see of what Sign it is, and note it on the zodiac of the rete on the other side. Also note its nadir, which is likewise the degree of the 7th Sign. And you may also find the day of the month from the degree of the sun; for the alidade, when once set upon the degree of the sun, will point out the desired day” (Gunther, pp. 169ff). Chaucer, on the other hand, deletes the unnecessary technical terminology and supplementary propositions to concentrate upon a single, elementary process: “Rekne and knowe which is the day of thy month, and ley thy rewle up that same day, and than wol the verrey poynt of thy rewle sitten in the bordure upon the degre of thy sonne” (550:1). Having separated out the core of information suitable to his pupil, Chaucer takes special care to define and redefine its salient features, to underscore crucial functions, and to make troublesome abstractions palpably graphic. With the general principle before him, Lewis is provided a series of practical exercises, evidently of Chaucer’s own computation and happily “compowned” for the child’s benefit “after the latitude” of Oxford: “Ensample as thus:—The yeer of oure Lord 1391, the 12 day of March at midday, I wolde know the degre of the sonne. I soughte in the bakhalf of myn Astrelabie and fond the cercle of the daies, the whiche I knowe by the names of the monthes writen under the same cercle. Tho leyde I my reule in the bordure upon the firste degre of Aries, a litel within the degre. And thus knowe I this conclusioun” (550:1). Lest Lewis miss the point of the demonstration or his attention momentarily flag, Chaucer gently tugs his pupil back to the lesson with the indulgent admonition to “understond wel” a second, at times a third, example of the principle’s workings.

Neither remote nor pedantic, Chaucer's pedagogy conveys the familiarity and warmth of a father's standing beside his son, looking intently over his shoulder as he guides the child through a maze of intricate operations.

A corollary to Chaucer's mode of amplifying Messahala's text is his proclivity for repetition. Adhering to his own dictum—"Me semith better to writen unto a child twys a god sentence, than he fogete it onys"—Chaucer avails himself of the traditional rhetorical conventions of *repetitio* (repetition) designed not only to embellish but also to emphasize the significance of one's material. Unlike Messahala whose treatise is notably free of any dilation, Chaucer's *Astrolabe* is replete with the schoolmaster's *topoi* (commonplaces) and schema designed to anticipate and thereby catch the student's puzzlement short of confusion. As Chaucer introduces the astrolabe to Lewis, for instance, he employs the figure *conduplicatio*, the repetition of a word or phrase of words in successive clauses, apparently to serve as a mnemonic device: "The est syde of thyn Astrolabie is clepid the right syde, and the west syde is clepid the left syde. Forget not thys, litel Lowys. Put the ryng of thyn Astrolabie upon the thombe of thi right hond, and than wol his right side be toward thi lift side, and his left side wol be toward thy right side. Tak this rewle generall, as well on the bak as of the wombe syde" (547:6). Similarly, as Chaucer approaches a crucial point, particularly a general principle upon which subsequent discussion is based, his inclination is to make almost extravagant use of anaphoric cues such as "understond wel" or "forget not thys" to call attention to the "conclusioun" and its purport: "Understond wel that these houres inequales ben clepid houres of planetes. And understond wel that some tyme ben thei lenger by day than by night, and som tyme the contrarie. But understond wel that evermo generally the hours inequal of the day with the hours inequal of the night contenen 30 degrees of the bordure. . . ." (552:10). But the most prevelant device is the elementary scheme of *interpretatio* or *synonymia*, used largely to rename technical nomenclature in homelier terms and signalled invariably by the catch-phrases "that is to seyn" ("But sothly the hous of the ascendent, that is to seyn, the first hous of the est angle, is a thing more brod and large" [551:4]), "or ellis" ("The whiche lyne is clepid the south lyne or ellis the lyne meridional" [547:4]), or the simple coordinate "or" ("the foure principales plages or quarters of the firmament" [547:5]). An adjunct to *synonymia* is Chaucer's penchant for recapitulating a concluding principle, underscoring its significance by a succinct restatement of its primary functions (*conclusio*): "tak there thin altitude meridian, this is to seyn, the highest of the sonne as for that day. So maist thou knowe in the same lyne the heighest cours that eny sterre fix clymbeth by night. This is to seyn that whan eny sterre fix is passid the lyne meridional, than begynneth it to descende; and so doth the sonne" (553:13).

Although medieval pedagogy relied heavily upon repetition (with the chilling result that a student may have been subjected to the same exercises in his Donat for five or more years), Chaucer's use of repetition is strikingly modern in its conception. For Chaucer, mere duplication of effort neither aids nor insures comprehension. Rather, at the center of his technique is the abiding principle that the child, however untutored, is able to grasp the most elusive abstraction if it is assimilated to the constructs of his own experience. Thus, Chaucer's repetition is invariably purposive: the reiteration of detail

and the restatement of idea never lapse into witless tautologies, but serve to connect, through a series of intelligible equivalences, the native categories of Lewis' perceptions with the operations of a more theoretical system.

In some extant manuscripts, the *Treatise on the Astrolabe* is titled *Bread and Milk for Children*. Whether the alternative title is Chaucer's own or that of a scribe is, on textual grounds, a moot point. On the more precarious grounds of tone, style, and authorial attitude toward both his material and his audience, the *Astrolabe* can hardly be characterized as a sop to a childish whim, for here there is no stooping to demeaning play. This is earnest work for both father and son. Indeed, the historical significance of the *Astrolabe* as the oldest treatise in English upon a scientific instrument confirms the popular assessment of its author as "learned Chaucer" (Gunther, 2 [1923], 202). But, his apparent technical craft aside, the measure of Chaucer's seriousness can be taken more clearly from his keen interest in his pupil's cognitive ability which, in turn, informs the treatise with a conception of the child striking in its modernity. Philippe Ariès notes, for example, that the notion of childhood, "that particular nature which distinguishes the child from the adult," is a rather recent formulation. "In medieval society this awareness was lacking" (p. 128). Whether Chaucer's *Astrolabe* is the lone harbinger of the modern attitude toward the child is difficult to appraise; nevertheless, its very existence invites a re-evaluation of the medieval idea of childhood. And Chaucer himself provides the premise for such a study. At the outset of his treatise, Chaucer defines what is to become the index of his attitude toward young Lewis as pupil and his "besy praier" to learn the operation of the astrolabe: "he wrappith him in his frend, that condescendith to the rightfulle praier of his frend" (545). For Chaucer, the landscape of Lewis' experience is the requisite starting place to investigate the heavens.

Footnotes

¹Philippe Ariès, *Centuries of Childhood*, trans. Robert Baldick (New York: Vintage Books, 1962), p. 187.

²*The Works of Geoffrey Chaucer*, ed. F. N. Roninson, 2nd ed. (Boston: Houghton Mifflin, 1957), p. 546. Hereafter, citations will appear in the body of the text with page and paragraph numbers noted.

³The Latin text is from *Early Science in Oxford*, ed. R. T. Gunther, 5 (Oxford: Oxford University Press, 1929).