Presenting manuscript tables and diagrams to the Middle English reader

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Abstract

In this paper, we examine information-organising graphic devices such as tables and diagrams in Middle English manuscripts. Our focus is on text producers' metadiscourse describing these devices and instructing the reader in their use. We also pay attention to the visual and spatial relationship between the graphic device and the surrounding text. Our findings indicate that the metadiscourse associated with graphic devices serves similar functions to image captions (verbal cueing) in modern textbooks: identifying and describing the devices and instructing the reader in using them.

Keywords

graphic devices, instructional writing, manuscript studies, metadiscourse, Middle English

1. Introduction

Tables, diagrams and other primarily non-representational graphic devices have a long history in human communication. In the Latin West, the table format was creatively applied to various kinds of theological, liturgical and computational purposes from early on (see Marchese 2013). Some early tabular devices are particularly well-known, for example Eusebian canon tables designed to indicate parallel passages in the gospels (e.g. Crawford 2019). Another early genre typically presented in tabular form is the calendar (e.g. Wieck 2017). Astronomical and astrological tables, also frequently found in medieval manuscripts, assist the user in calculating the movements and influence of celestial bodies (e.g. Falk 2016).

In addition to tables, also various other schematic and diagrammatic visual representations were developed for different purposes. Murdoch (1984: 113–160) surveys a variety of scientific and mathematical diagrams in ancient and medieval manuscripts. Studies of more specific diagrammatic traditions in medieval science include those by Wallis (2015) on computus and Obrist (2020) on

cosmology. In religious instruction, graphic devices shaped like trees and wheels were used to visualise relationships between theological concepts (Sandler 1983).

As tables and diagrams are closely associated with science and theology in the medieval West, they predominantly occur in monolingual Latin contexts. From the later fourteenth century onwards, however, these graphic devices for knowledge organisation and construction are also increasingly found in vernacular contexts, including manuscripts and texts written in or containing English (see further Section 4 below). The increased presence of such technical devices in Middle English (henceforth ME) – especially in science and theology – may be associated with the overall broadening of the functions of written English during the later medieval period, whereby texts belonging previously to almost exclusively Latin domains and genres were gradually translated and adapted for new, more or less experienced audiences (on this process, see e.g. Pahta and Taavitsainen 2004).

As graphic devices were introduced to vernacular contexts, text producers had to communicate their ontology and use to readers who were not always familiar with such visualisations and related literacy competences. Overall, it may be surmised that especially nonspecialist readers' successful acquisition of practices for organising information and constructing knowledge with graphic devices would have benefited from linguistic support and instruction provided by text producers. The present study focuses on this linguistic support provided for users of tables and diagrams in ME manuscripts.

In this article, we examine how late medieval English text producers (authors, scribes, rubricators, etc.) facilitated their readers' comprehension and navigation of potentially novel graphic devices in the vernacular context. Analysing this linguistic support from a pragmaphilological viewpoint promises to shed new light onto how text producers perceived the graphic literacy skills and competences of their intended audiences. Our discussion is informed by findings in multimedia learning and educational psychology about the present-day use of image captions (verbal cues) for example in science textbooks. We also note uses of graphic devices in ME texts without verbal cueing and consider possible reasons for the absence of verbal cues.

In Section 2, we introduce our key operational concepts from data visualisation, multimedia learning and educational psychology. Section 3 focuses on the multifaceted concept of metadiscourse and explicates its role in our analysis. Section 4 reviews previous scholarship on graphic devices in ME texts and manuscripts and describes the primary sources consulted for the present study. Metadiscursive practices associated with graphic devices are analysed in Section 5, followed by concluding remarks in Section 6.

2. Graphic devices and reader instruction

Research into modern data visualisation shows that the cognitive processes and practical literacy skills required for the reading of graphic devices differ from those associated with reading monomodal texts (e.g. Wright 1981 on tables; Purchase 2014 on diagrams). The reader's comprehension of the device may also crucially depend on how the device is integrated with the surrounding text, and whether any explicit metalinguistic information is provided about the purpose of the device (e.g. Reinking, Hayes and McEneaney 1988). In modern textbooks and scholarly publications, an important role in this respect is played by the caption, defined by Kembhavi et al. (2016: 239) as "[a] text box that adds information about the entire image, but does not serve as the image title". As Pozzer-Ardenghi and Roth observe,

> [t]he captions of figures are essential moments in a competent reading of both text and figure, because the caption provides descriptions of the inscriptions [= the graphic devices], in many instances also expanding on the conceptual topic that is directly related to the inscription. In providing descriptions of what is in the figure, captions also *instruct* readers about how to read the inscriptions (2010: 235; gloss added, emphasis in the original).

This formulation highlights two major functions of the modern caption: to *describe* the graphic device and to *instruct* the reader in its operation. Bernard (1990) accordingly distinguishes between descriptive and instructive 'extended captions' in textbooks (for a more fine-tuned typology, see Smith 2020). These two functions also reflect the kinds of captions identified by Slough et al. (2010) in their survey of graphic devices in sixth-grade science textbooks. In addition to such higher-level descriptive and instructive 'extended' caption types, Slough et al. (2010) came across a basic type of caption which simply *identifies* the device without providing further details. In Section 5 below, we investigate the *identifying*, *describing* and *instructing* functions of the caption-like elements in our ME material.

In addition to captions, readers' comprehension of the graphic device is facilitated by indexical references to it in the body text surrounding the device, such as "see Figure 1" (Pozzer-Ardenghi and Roth 2010: 312). Readers' potential cognitive overload may also be reduced by longer verbal instructions for using the device. Finally, although sometimes viewed as a textual entity formally separate from the modern caption (Kembhavi et al. 2016: 239, but cf. Slough et al. 2010: 312), the title of the graphic device often provides a basic identifying label for it and thus participates in conveying information about the device.

In research into multimedia learning, the terms *signalling* and *cueing* are used with reference to the pedagogical support for the comprehension of multimedia content:

> The signaling principle, also known as the cueing principle, refers to the finding that people learn more deeply from a multimedia message when cues are added that guide attention to the relevant elements of the material or highlight the organization of the essential material (van Gog 2021: 221).

Cues can take both verbal and visual forms, for example explicit verbal instructions that ask the learner to pay attention to a specific graphic element or the use of colour, shading or iconic symbols (see van Gog 2021: 222–224 for examples of empirical studies investigating effects of such cues). The forms of linguistic support examined in the present study are associated with verbal cueing.

3. Metadiscourse

Our examination of ME verbal cues associated with graphic devices is aided by the concept of *metadiscourse*. The concept provides a helpful umbrella term for resources with which writers can take readers into account in order to guide them in the interpretation of discourse (Hyland 2018: xi; for a helpful overview of the concept, see Flowerdew 2015).

Research on metadiscourse has from early on tended to recognise two basic orientations in the use of metadiscursive resources: toward text/discourse and toward discourse participants. Inspired by the Hallidayan textual and interpersonal functions of language, Vande Kopple (1985) first proposed a division between textual and interpersonal metadiscourse. In a nutshell, textual metadiscourse elucidates the organisation and intended meaning of the text for example by means of text-deictic expressions and glosses (and thus corresponds to what some researchers call *metatext*, see e.g. Ädel 2006: 20). Interpersonal metadiscourse draws attention to resources such as personal pronouns that convey the writer's and reader's presence in the communicative situation. After Vande Kopple, this division was developed further in a number of studies (e.g. Hyland 1998, Fuertes-Olivera et al. 2001). However, critics found these categories overly dichotomous and not quite compatible with Halliday's understanding of the textual and interpersonal functions. Furthermore, situating the textual and interpersonal categories on the same hierarchical level was found to be at odds with the inherently interpersonal communicative function of metadiscourse (see especially Ädel 2006: 16–17).

Echoing Ädel (2006) and Mauranen (1993), Flowerdew (2015: 22) points out that in its ultimate function of reader guidance, all metadiscourse may be viewed as interpersonal (see also Hyland 2017: 20 on metadiscourse as "interpersonal resources"). The textual and interpersonal dimensions should therefore not be viewed as mutually exclusive functional categories, but rather as orientations that help us understand metadiscursive phenomena and operationalise research into them (see also Flowerdew 2015: 18, Hyland 2018: 31–32). The inter-relatedness of the dimensions in encompassing the writer's pragmatic interpretation of the whole communicative situation is expressed succinctly by Hyland and Tse (2004: 167): "metadiscourse is identified as the writer's reference to the text, the writer, or the reader and enables the analyst to see how the writer chooses to handle interpretive processes as opposed to statements relating to the world".

Models of metadiscourse and taxonomies of metadiscursive resources vary with regard to the textual and interpersonal features that researchers include under their scope. In this study, we largely follow Ädel, who delimits metadiscourse to "linguistic material which reveals the writer's and reader's (or speaker's and hearer's) presence in the text, either by referring to the organisation of the text or by commenting on the text in other ways" (Ädel 2017: 55). Textual and interpersonal orientations are acknowledged through the respective notions of *text/code visibility* and *writer/reader visibility* (see Ädel 2017: 59). In this so-called "reflexive" approach to metadiscourse, the concept is limited to the "world" of the current (ongoing) text and discourse, so that for example intertextual references to other texts are excluded (Ädel 2017: 56; see also Ädel 2006: 16–20, Ädel and Mauranen 2010; for "inter-textual metadiscourse", Ifantidou 2005; cf. *evidentials* as intertextual metadiscourse discussed by Hyland 2018: 60–61). Unlike Ädel, our analysis also addresses some lexical *attitude markers* (Hyland 2018: 62) that convey the writer's evaluation of the graphic devices, especially evaluative adjectives and adverbs (see further Section 5.2). We do not, however, seek to analyse stancetaking expressions more widely or systematically.[1]

As this study examines metadiscourse related to graphic devices, we subscribe to a multimodal understanding of discourse that includes both verbal and visual semiotic resources (see e.g. Bateman 2009). Those graphic devices to which metadiscourse pertains in the form of captions and other verbal

[1] As Alonso-Almeida observes, "[s]tance is used in discourse to convey information other than literal", which situates it as a concept quite close to metadiscourse (2009: 15–16). We acknowledge that if stance is understood in a broad sense "as an umbrella term to refer to diverse interpersonal language strategies which reveal the author's position with respect to his/her text" (Alonso-Almeida and Mele-Marrero 2014: 4), it could provide an alternative framework from which to approach the phenomenon at hand (Grund 2021: 75–78 provides a useful overview of linguistic conceptualisations of stance in which the range of features situated under it varies a great deal; see also Kaltenböck et al. 2020).

cues are thus viewed as elements of discourse (cf. the 'classical' definition of metadiscourse as "discoursing about discourse" by Crismore 1989: 7). In practice, however, we acknowledge the possibility that graphic devices may themselves have a metadiscursive reader-guiding function and that in multimodal graphic devices some visual features may work as metadiscourse (cf. the concept of *visual metadiscourse* discussed by Kumpf 2000 and Al-Subhi 2021; see Hiippala and Bateman 2020 on the multimodality of diagrammatic representation). While our analysis focuses on *linguistic metadiscourse* (sections 5.2–5.4), the first subsection of the analysis (5.1) addresses rhetorical relationships between graphic devices and the text associated with them with regard to their respective 'primacy' (and thus their status as discourse vs. *meta*discourse).

The overall relevance of the concept of metadiscourse to historical writer–reader communication was first demonstrated by Crismore (1989: 7–47). A majority of metadiscourse scholarship and key developments in its theory formation have been made in studies addressing present-day academic metadiscourse. Different genres and communicative situations, however, may call for changes to metadiscourse models (see e.g. Ädel 2017). Similarly, taxonomies of metadiscursive resources developed on the basis of present-day materials may not be fully applicable to historical texts whose situational and socio-cultural contexts cannot always be fully reconstructed (cf. Taavitsainen 2006: 436 concerning the applicability of Hyland's typology between "interactive" and "interactional" resources to early medical writing).

Studies of historical English metadiscourse emerged at the turn of the millennium. Pioneering research in this area has been conducted on Middle and Early Modern English medical writing, especially by Taavitsainen (Taavitsainen 2000, Taavitsainen 2006, Taavitsainen and Hiltunen 2012; see also Quintana-Toledo 2009 on ME recipes and Whitt 2018 on an Early Modern English (EModE) midwifery manual). In addition to medical texts, historical English metadiscourse has been examined for example in religious writing (Boggel 2009), news discourse (Bös 2017) and school grammars (Domínguez-Rodríguez and Rodríguez-Álvarez 2015). Historical interfaces between metadiscourse and related textual and pragmatic phenomena and concepts have been explored in the volumes edited by Busse and Hübler (2012) with regard to metacommunication and metapragmatics and by Peikola and Bös (2020) with regard to paratext. Despite the growing interest in historical metadiscursive phenomena and the identification of image-captions as examples of metadiscourse already by Crismore (1989: 43), however, the verbal cuing of graphic devices has, to our knowledge, not been addressed in these studies.

Methodologically, research on both historical and present-day metadiscourse has been dominated by corpus linguistic approaches. Automatised detection of realisations of metadiscourse by their form alone, however, is practically impossible in semantically/pragmatically unannotated corpora, so contextual qualitative examination of the findings is a necessity also in primarily quantitative studies (see e.g. Ädel 2017: 59, Hyland 2017: 18–19, Varila 2020: 211–212). Quantitative comparisons of metadiscursive tokens may also be complicated by the potential of metadiscourse to be realised through a wide range of linguistic and textual forms – from individual words and phrases to multi-sentence units and ultimately entire sections of books like prefaces, i.e. what Taavitsainen (2006: 440) calls *macrolevel metadiscourse* (cf. Hyland 2017: 18).

The present study proceeds from our close reading of verbal cues associated with graphic devices in ME texts and thus adopts a qualitative approach to metadiscourse (along the lines of e.g. Taavitsainen 2006, Chaemsaithong 2013, and Domínguez-Rodríguez and Rodríguez-Álvarez 2015). Our focus lies not on the classification of metadiscursive features *per se*, but we essentially seek to understand how ME text producers contextualised graphic devices linguistically for their readers. We also contend that understanding the historical nuances of this phenomenon may sometimes be enrichened by juxtaposing different conceptualisations of similar features of metadiscourse instead of a strict adherence to any single typology. Since no electronic corpus of ME texts containing graphic devices exists, finding and locating such material in the first place proved to be a complex undertaking, as described in Section 4.

4. Primary sources

Our starting point was to locate instances of graphic devices and text associated with them in ME texts. In the absence of a single comprehensive resource of medieval English texts and manuscripts containing graphic devices, the search procedure for relevant materials involved the consultation of a variety of mutually complementary sources, including both catalogues and previous research articles.

Four major printed and digital bibliographic catalogues of medieval English materials were consulted (A–D). (A) Descriptions of ME works in the printed multi-volume *A Manual of the Writings in Middle English, 1050–1500* (Severs, Hartung and Beidler 1967–2005) were read to find mentions of the use of graphic devices and verbal cueing related to them. Here especially the volume by Keiser (1998) on "Works of Science and Information" proved useful. (B) The indexes of titles and rubrics, incipits and explicits in *The Index of Middle English Prose*, vols. 1–20, were searched to identify references to graphic

devices. A PDF file of Rand (2014) and the new digital resource at http://imep.lib.cam.ac.uk/ were used to search mentions of graphic devices or their verbal cues with the truncated search terms can*/kan* (for variants of the Middle English Dictionary (MED) headword *canŏun* 'canon'), cerc*/circ* (for *cercle* 'circle'), fig*/fyg*/ffig*/ffyg* (for *figūre* 'figure'), cal*/kal* (for *calendĕr* 'calender'), rewl*/reul*/rul* (for *reule* 'rule'), sper*/spir*/spyr*/spher* (for *spḗre* 'sphere') and tab* (for *tāble* 'table'). The search terms were based on earlier studies on ME graphic devices and insights gained in our own previous research on them. (C) The expanded *Scientific and Medical Writings in Old and Middle English: An Electronic Reference* (Voigts and Kurtz 2019) was searched using the same terms; the searches included both ME and PDE forms to retrieve hits from both ME incipits and rubrics and PDE metadata. (D) Volumes I–III of the printed resource *An Index of Images in English Manuscripts from the Time of Chaucer to Henry VIII* (Scott 2000–) were examined to see what ME material was identified as containing diagrammatic material.

Our searches brought up a large amount of potentially relevant ME material containing graphic devices and verbal cues associated with them. However, the catalogues also indicate that there may be considerable variation between individual copies of the same work in their use and contextualisation of graphic devices, and that much of this material in fact remains unedited and lacks proper text critical scrutiny. Furthermore, especially in *An Index of Images in English Manuscripts from the Time of Chaucer to Henry VIII*, the linguistic context of the graphic devices found in multilingual miscellanea is often difficult to ascertain on the basis of the catalogue entries alone without recourse to the manuscripts themselves. Overall, then, the textual landscape of ME graphic devices appears rich and varied, but a lot of basic research remains to be conducted to chart it systematically.

To ascertain the feasibility of the present study, our final selection of primary sources was also guided by previous studies of graphic devices in ME texts. Not only do such studies elucidate textual relationships between copies of texts and individual manuscripts, but they also present helpful findings concerning the communicative situation and its participants. However, since graphic devices like tables and diagrams do not represent the kinds of linear and monomodal written texts typically studied by linguists, philologists, and textual scholars, the amount of such previous scholarship is rather limited. Studies and editions of unique or textually related individual devices consulted by us include Voigts (1986) on the 'Sphere of Life and Death' in BL MS Harley 3719, Voigts (1994) on the 'Golden Table of Pythagoras', Mooney (1998) on the *Kalendarium* of John Somer, Gottschall (2008) on the Pater Noster diagram in the Vernon manuscript and Peikola (2013) on tables of lections in Wycliffite Bible

manuscripts. In addition, editions of ME scientific texts that contain tabular and diagrammatic devices were consulted, including Rand Schmidt (1993) for *The New Theorik of Planets* and Eisner (2002) for Chaucer's *Treatise on the Astrolabe*. Furthermore, our selection of materials was facilitated by studies of more general types of graphic device in ME materials such as Voigts (1989) on graphic materials in scientific and medical books and Peikola and Varila (2023) on calendars. Other studies that proved helpful for locating sources include Means (1992) on ME popular computistic writings and Kennedy (2014) on ME Books of Hours.

In practice, the limited availability of relevant material in editions requires direct access to manuscripts or their digital facsimiles. Moreover, although some of the text-based material has been edited or made available in databases and corpora, technological constraints and copyright legislation may make the inclusion of the graphic device itself impractical or even impossible. This has been an issue especially in printed editing, but makers of digital editions, databases and corpora also have to wrestle with similar challenges. Analysing metadiscourse is obviously complicated if the actual discourse to which it pertains (i.e. the graphic device) is not available for the researcher. It is therefore often necessary to access manuscript materials even for edited texts.

In addition to using photographic reproductions acquired for our previous research, we located some relevant digitised manuscripts made publicly available by UK and US repositories, as well as purchased some images. Our main single source for the acquisition of new data for this study was the British Library, visited by one of us in December 2018 to inspect and photograph potentially relevant manuscript material on the basis of the preliminary mapping of the field as outlined above. A complete list of the manuscripts consulted is presented in the Appendix. Most of these manuscripts were made in the fifteenth century, but there are also some representatives of the late fourteenth and the first half of the sixteenth century. The texts are broadly situated in the domains of science and theology, which corresponds to what is known about the medieval contexts of use of tabular and diagrammatic devices in the Latin West more generally. The major types of graphic devices examined include astronomical/astrological and medical tables, diagrams and figures; calendars and other computistic tables; and tables for locating biblical readings at Mass.

5. Presenting graphic devices in Late Medieval English texts

This section begins with an overview of the relationship between graphic devices and their verbal cues in our ME data (subsection 5.1). The cues vary somewhat in their length and form, from short heading-like textual units (titles, rubrics, incipits) to longer prose items (explanations, rules, canons). In our closer analysis, we examine the use of verbal cues associated with graphic devices for *identifying* the device (subsection 5.2); for *describing* spatial, visual and verbal features of the device (5.3); and for *instructing* the reader in the use of the device (5.4).

5.1. Relationship between device and verbal cues

It is useful to survey our material first at a macro level to see what kinds of spatial and proportional relationships there exist between the devices and the cues associated with them. Firstly, we can pay attention to the physical proximity of the device and its associated metadiscourse on the manuscript page (cf. Pozzer-Ardenghi and Roth 2010: 308 about how the effectiveness of the graphic device for the reader is enhanced by the physical proximity of the device on the page to the related text). Secondly, in some cases either the device or metadiscourse related to it is absent, for one reason or another. Such cases may sometimes reveal whether the graphic device or the text associated with it was considered to be more important – in other words, whether a text is 'glossing' the device or whether the device is actually serving to illustrate the text (cf. Anesa and Formasini 2017: 24–35, Jones 2016 [2006]: 3–15; consider also the discussion about visual metadiscourse in Section 3). Thirdly, variations in verbal cueing between manuscripts containing similar graphic devices may provide clues about the graphic literacy skills that text producers expected from their readers.

Whether or not the device and the related text occupy the same page of the manuscript depends on both the size of the device and the function and length of the metadiscursive element vis-à-vis the physical size of the page (cf. the *canvas constraints* discussed by Bateman 2008: 17–18). Labels and other textual elements integrated into the design of the device cannot really be placed elsewhere. Metadiscursive elements presented visually as headings or using a deictic incipit formula such as "here begynneth" similarly tend to be physically proximate to the device on the same page. Longer explanatory texts, however, are often not presented on the same page with the device. The most apparent reason for this is their length, but clarity and the practical visual need to clearly distinguish the verbal cue from the device may also have been a factor. In such cases metadiscourse may inform the reader about the placement of the device elsewhere (Example 1):

(1) ther ys made a table folowy*n*g on þ*e* bakk sy3d off the next leff [‘A table follows on the back side of the next leaf.’] (canon for a table of moveable feasts, Bodleian Library MS Wood D. 8, f. 19v)[2]

Some scribes came up with handy solutions to keep the canon and device together. One such example is the so-called zodiac man that depicts the zodiacal signs affecting different parts of the body (for a digital reproduction available online, see e.g. British Library MS Harley 2332, f. 18r). The device is sometimes surrounded by text that verbalises these relationships and instructs in bloodletting or timing medical procedures more generally. This is the case for example in a ME version of the *Kalendarium* of John Somer in Bodleian Library MS Ashmole 391 (Part II, f. 3r). In several manuscripts of the Latin version of the *Kalendarium*, a blank space has been left for the figure of the zodiac man that was never executed (e.g. British Library MSS Cotton Faustina A II f. 10v, Royal 2 B VIII f. 12r, Sloane 282 f. 6r; for a detailed analysis of the zodiac man pages in the *Kalendarium* manuscripts, see Witherden 2017). The figure of the zodiac man is also missing from the ME version of the *Kalendarium* in British Library MS Cotton Vitellius A I, where a space has been left in the bottom corner of one of the pages that contain the canon (f. 18r), possibly in anticipation of the figure (see also Mooney 1998: 61, Witherden 2017: 105, n. 26).

These examples suggest that for some readers of Somer’s *Kalendarium* the instructive text on the zodiac man may have been considered to be more relevant than the image. In cases where the image has not been executed and the instructive text does not explicitly refer to it, the status of the text as metadiscourse may be questioned (cf. Ädel’s 2017: 56 emphasis on the referential relationship of metadiscourse to the “world of discourse”). Witherden likewise notes the “possibility that there were contexts for use in which the text could be productively employed without the diagram” (2017: 92; see also Jones 2016: 9–10). The possible primacy of text over image in this work may thus mean that producers or readers of *Kalendarium* manuscripts did not always see a pressing need to commission the zodiac man illustration. The relative functional independence of the text in this case is also suggested by how the ME text associated with the zodiac man does not in itself contain verbal cues that would refer explicitly to the figure. In the Ashmole manuscript, the link between the text and figure is spelled out only at the end of the opening rubric that precedes these elements and may thus be viewed as a caption-

[2] Our transcriptions from manuscripts follow the spelling, capitalisation and punctuation of the source. Abbreviations are expanded with italics. Angular brackets indicate uncertain readings resulting from the quality of the manuscript or its reproduction.

like element (Example 2). The caption highlights the metadiscursive function of the figure in facilitating the reader's understanding of the canon.

(2) Now seweþ a canon þ*at* declareþ þe p*er*ele of þe xij signes þat reigneþ in sondri parties of þe bodies of iche resonable creature as ye mow se by þis figure here p*re*sent ['Now follows a canon that states the perils of the 12 signs that govern the various parts of the body of each rational being, as you may see by this figure here present'] (Oxford, Bodleian Library MS Ashmole 391, Part II, f. 3r)

In Chaucer's *Treatise on the Astrolabe*, the main text itself describes the astrolabe instrument and instructs the reader in its use and construction. Ten of the thirty-four manuscripts that contain the *Astrolabe* in whole or in part also contain diagrams that support these verbal descriptions; in one manuscript, gaps are left in the text for the diagrams that were never executed (see Eagleton and Spencer 2006: 250, Eagleton 2007: 304–305). A phylogenetic study of the witnesses found that seven of the manuscripts containing diagrams are closely affiliated textually; the authors surmise that this group in fact represents the earliest phase of transmission of the *Astrolabe* (Eagleton and Spencer 2006: 250–251, Eisner 2002: 40–43). While it would thus seem that the diagrams were envisaged to form an integral part of the work from the start, a majority of the extant copies do not contain them. The absence of the diagrams may undoubtedly sometimes reflect the resources of the text producers. Even in copies that contain diagrams, however, their supplementary status (as a kind of visual metadiscourse) is suggested by the typical formulation of the short indexical references to them in the text: "And for *the more declaracioun*, lo here the figure" (e.g. Eisner 2002: 127, ll. 156–157; our emphasis).[3] In this instance, it may be argued that the indexical linguistic references to the figures constitute 'second-level' metadiscourse in being themselves directed at features of metadiscourse within the same text.

The opposite kind of situation, when the graphic device takes priority over the linguistic element associated with it, may be seen in the liturgical calendar. Neither Latin nor English versions of this common tabular device tend to be furnished with instructions pertaining to its use when the calendar only contains the standard set of columns for the saints, the Roman calendar, and the dominical letter and golden number used for calculating Easter Sunday (for these elements, see e.g. Wieck 2017: 10–11, Peikola and Varila 2023). Presumably this basic form of the calendar was expected to be familiar to the readers. However, when more astronomical information was added to the basic form, the need for verbal

[3] 'And for further explanation, see the figure here.' See *MED*, s.v. *declărāciŏun*, "2. (a) An explanation, interpretation; a statement added for clarification; (b) a statement added to a proposition, a deduction from a theorem, a corollary."

cueing seems to have increased. The ME canon of Somer's *Kalendarium* in MS Ashmole 391, for example, describes the contents of the various astronomical columns one by one, but summarises the standard set of columns in a single entry that also spells out their common character:

(3) þan folow*ith* thre lynes after þe comon cours of calenders ['Then follow three columns in the manner of the common practice of calendars.'] (Oxford, Bodleian Library MS Ashmole 391, Part II, f. 1v)[4]

Finally, there are major differences in the amount of verbal cueing associated with tables of lessons, a common paratextual element in manuscripts of the Wycliffite Bible. These tables were designed to aid the reader's navigation of biblical readings at Mass throughout the liturgical year (see Peikola 2013). Tables found in manuscripts of the Later Version of the translation are often furnished with a long incipit (opening rubric) that explains how the table is structured and organised. In contrast, tables of lessons in Earlier Version manuscripts and in some early Later Version copies often rely on short descriptive labels. The smaller amount of verbal cueing may suggest that a more professional and graphically literate audience was anticipated for these manuscripts (for examples and further discussion, see Peikola 2013).

5.2. Identifying the device

We now proceed from macro-level device–text relationships on the manuscript page to examine features of linguistic metadiscourse in verbal cueing associated with the graphic devices. It can first be observed that identifying the graphic device – the basic functional level of modern captions – seems in our material to be an almost inherent characteristic of ME rubrics and incipits associated with a device. The device is often identified in an indexical expression containing a place deictic element that links the cue explicitly with the named device and briefly states the purpose of the device, as in Examples 4 and 5. In terms of Hyland's metadiscursive resources, such expressions especially make use of *endophoric markers*, which "refer to information in other parts of the text", and *code glosses*, which "elaborate propositional meanings" (Hyland 2018: 58). In Ädel's framework, the expressions variably reflect functional subtypes of *interpersonal metadiscourse* (*phorics*, *references to the text/code*, *code glosses* and *discourse labels*) (see Ädel 2006: 100–121). These types of expression are also included as a linguistic element in Kumpf's model of visual metadiscourse (see Kumpf 2000: 415–416 for the category of *interpretation*, which

[4] The meaning 'a column in a table' for the noun *line*, as shown in this example, appears not to be recorded by the *Oxford English Dictionary* (*OED3*, s.v. *line*, n.2) or the *Middle English Dictionary* (s.v. *līne*, n.(1)).

"links visuals to the text and helps add cohesion between the textual and visual elements"). For the reader of the ME text, the indexical expression serves as a token that highlights the metadiscursive status of the textual element. Rubrics and incipits may also be written in red ink or highlighted otherwise, which shows how linguistic and visual metadiscourse work together (cf. the *style* category of visual metadiscourse discussed by Kumpf 2000: 416–418).

(4) **<h>ere** bigy*n*neþ a **rule þat telliþ** i*n* whiche chapitris of þe bible **ȝe mai fynde** [...] ['Here begins a rule that indicates in which chapters of the Bible you may find...'] (incipit for a table of biblical lessons, Cambridge, Jesus College MS O.D.6, f. 22r, emphasis added in bold here and in the following examples)

(5) **This tabil ys to know** how moche th*ou* shalt have for on fote square oth*er* in ston*e* or ty*m*byr [...] ['The purpose of this table is to know how much you shall have for one foot square either in stone or timber...'] (rubric for a table of measurements, Yale MS Beinecke 558, f. 87v)

Similar comments also occur at the beginning of longer explanatory canons or at the beginning of new subsections devoted to the discussion of a new graphic device. As seen in Examples 6–7, the writer may also explicitly invoke the act of naming the device (cf. the discourse labels related to acts of saying and defining in modern academic metadiscourse discussed by Ädel 2006: 62–64, 117):

(6) Now folowiþ þe thrid table þ*at* **is cleepid** a voluelle or a lunary […] ['Now follows the third table, which is called a volvelle or a lunary...'] (canon for the *Kalendarium* of John Somer, Oxford, Bodleian Library MS Ashmole 391, Part II, f. 2v)

(7) Þ*er*fore þe firste table **I deme nouȝt vnworþily to be called** þe table complete of .12. houses ['Therefore the first table I judge not undeservedly to be called the complete table of the twelve houses.'] (canon of Walter Anglus, alias John Walter, British Library MS Royal 12 D VI, f. 81r)

The labelling of the device sometimes contains evaluative language that makes these cues potentially somewhat different from modern, more 'neutral' captions (as in Example 7: "nouȝt vnworþily"). Hyland (2018: 62) discusses this kind of metadiscourse under the category of *attitude markers*. It has been applied to historical English metadiscourse for example by Quintana-Toledo (2009) and Chaemsaithong (2013); the term *stance-marking* is preferred for example by Boggel (2009) and Whitt (2018) in their studies of historical metadiscourse. Several English historical linguists have also worked on similar features outside a metadiscourse framework from the perspective of stance, including

Biber (2004), Alonso-Almeida (2009), Alonso-Almeida and Mele-Marrero (2014) and Grund (2021). In our material, metadiscourse that describes the benefits of the graphic device for its user occurs in rubrics and incipits that immediately precede the device on the page. A table may, for example, be described as "good" and "profitable", as in an incipit for an enumerated list of articles of the faith (Example 8). Although such stance-marking adverbs (Example 7) and adjectives (Example 8) ultimately express judgements made by the writer outside the text, their metadiscursive status is evident in how they are applied to entities within the world of discourse (i.e. graphic devices).

(8) Here begynneth a **good & a *pro*fitable** table of the feyth of *cri*sten people. ['Here begins a good and profitable table of the Christian faith.'] (British Library, MS Additional 10106, f. 39v)

Evaluative metadiscourse of this kind may also highlight the easy use of the device (Example 9) or emphasise its long-lasting value (Examples 9 and 10):

(9) <In> þis table men mow know **liȝtliche eu*er*e more** what [...] ['In this table one may easily know at all times what...'] (rubric for an Easter table, British Library MS Additional 27592, f. 4r)

(10) the wych table schall **eu*er* endure. whyle þ*e* world stand<yth>** ['the which table shall last as long as the world endures'] (canon for a table of moveable feasts, Bodleian Library MS Wood D.8, f. 19v)

The value of tables and other graphics can also be emphasised by referring to their makers and original context of production. Although these references describe events and people that are spatiotemporally removed from the writing and consumption of the text at hand, their function is metadiscursive in how they provide supplementary information about the text (cf. Vande Kopple 1985: 84 for the *code-glossing* function of metadiscourse). *The Golden Table of Pythagoras,* for example, opens with an explanation of how "Maister Pictagorus þe noble philosophre" ('Master Pythagoras the noble philosopher') had first come across the table in the hall of the king in a "lond þat is callid Appolonius" ('land that is called Apollonius') (Voigts 1994: 131). The text continues with information that emphasises the arcane and exotic qualities of the device (Example 11):

(11) And þere he say [...] **a riche & a wondirful table** þat þe kyng hadde maad soþli wiþ gold & siluer & sable & enamelid, & writen þerinne & grauen wiþ lettris of Arabic **manye diuers þingis & wondris** & what þe table mente & þe **priuytee þerof** ['And there he saw [...] a rich and wonderful table that the king had had made truly with gold and silver and black and enamelled, and written

therein and engraved with Arabic letters many diverse things and wonders and what the table meant and its secrets'] (*The Golden Table of Pythagoras*, ed. Voigts 1994: 131–132; the base text of her edition is Cambridge, Gonville & Caius College MS 336/725)

The Newe Theorik of Planets likewise contains approving accounts of mathematical operations and authoritative decisions made by table makers of old; in addition to "Philosophres" (as in Example 12), the forms of reference to these authorities include "tabularijs or […] table makers" and "(C)Ompositou*r*s or make*r*s of tables" (see Rand Schmidt 1993: 227, 231).

(12) **Philosophres** þat maden tables […] **fonde soþly** by instrumentes at a tyme where þei wolde bigy*n*ne her tables. þe place of þe sunne ['Philosophers that made tables [...] established accurately with instruments the location of the sun at the time from which their table starts'] (Rand Schmidt 1993: 216)

5.3. Describing the device

As observed in Section 2, description and instruction have been identified as two major functions of the so-called extended captions of modern textbooks. Metadiscourse serving these functions also occurs in ME explanatory canons and longer rubrics associated with graphic devices. The treatment of the two themes is often intertwined in text, although they may also be addressed in different parts of the canon (see Example 19). For the sake of clarity, we illustrate these themes here under separate subsections (with Section 5.3 focusing on descriptive metadiscourse and 5.4. examining reader instruction). Overall, the material illustrated in 5.3 highlights the textual orientation of metadiscourse especially in terms of code-glossing and discourse labelling, while that in 5.4 foregrounds the interpersonal orientation by making the presence of discourse participants explicit.

Descriptive metadiscourse may address various aspects of the textual, visual and spatial organisation of the device. It may, for example, name its parts or components – like the *lines* (columns) and the *head* of a table (as in a canon for a table of moveable feasts in Bodleian Library MS Wood D. 8 f. 19v), or the *circle*, *tongue, figure* and *hole* that constitute the design of a three-dimensional figure (volvelle) in Example 13:

(13) þan aboue þat is þe leest **cercle** of alle þeis. þe which haþ a **tonge** w*ith* þe **figure** of þe moone on it/ and w*ith*yn it is an **hoole** [...] ['then above that is the smallest circle of them all that has a pointer with the figure of the moon on it, and within it is a hole...'] (canon for the *Kalendarium* of John Somer, Oxford, Bodleian Library MS Ashmole 391, Part II, f. 2v)

In addition to naming the components, descriptive metadiscourse also often indicates what kind of information these components provide (Examples 14 and 15):

(14) **In the thyrde lyne ys schewyd** the ende of the day lyȝt [‘In the third column is shown the end of the daylight’] (explanation for a calendar, National Library of Wales, Brogyntyn MS ii.1, f. 6v)

(15) in þis table next folewinge. [...] **l*ett*res of þe .abc. bitokeneþ** þe dignitees of planetis [‘in this table that follows next ... the letters of the alphabet represent the dignities of planets’] (Richard of Wallingford’s *Exafrenon*, Cambrigde, Trinity College MS O.5.26, f. 178r).

To understand the information provided in the device, the user sometimes needs to be alerted to its colours, typically black or red, as in Example 16:

(16) And the nombyr of the ourys of the planett*es* is writtyn *with* **redde** figurys i*n* the hedde of the tabule [‘And the number of the hours of the planets is written with red figures in the head of the table’] (canon for a planetary calendar, Yale, Beinecke Rare Book & Manuscript Library MS Takamiya 95, f. 13v)

To help the reader locate the specified information, metadiscourse also describes spatial relations within the device. In a spherical diagram, for example, the precise location of a textual element may be expressed in relation to the compartments and rules of the device (Example 17). In a table, reference can be made to the number of the column (as in Example 14 above) or the relative location of an item within the column (Example 18).

(17) Þese wordis are writen in the **firste space** of þe spere aboute þe **ouer rule** [‘These words are written in the first space of the circle around the upper rule’] (*The Golden Table of Pythagoras*, ed. Voigts 1994: 134)

(18) and **a boute þe myddel** of þe same lyne is marked a newe signe [‘And around the middle of the same column is indicated a new sign’] (canon for the *Kalendarium* of John Somer, Oxford, Bodleian Library MS Ashmole 391, Part II, f. 1v)

5.4. Instructing the reader

We now move from primarily device-descriptive, metalinguistically functioning elements (cf. Ädel 2006: 39–40) to metadiscourse that more directly guides and engages the reader as the projected user of the graphic device. In major models of metadiscourse based on present-day linguistic data, these kinds of resources are discussed for example under *interactional metadiscourse* by Hyland (especially *engagement markers*, Hyland 2018: 62) and under *directive* (reader-oriented) functions of metadiscourse by Ädel (e.g. 2006: 39–40). In addition to using Hyland's category of engagement markers (e.g. Quintana-Toledo 2009, Domínguez-Rodríguez and Rodríguez-Álvarez 2015), studies of historical metadiscourse have approached such resources for example through features of *audience guidance* (Taavitsainen 2006) and through *person markers* and *dialogic devices* (Chaemsaithong 2013). In her study of metadiscourse in late ME and EModE religious texts, Boggel views these kinds of resources under the label *instructional metadiscours*e, "which serves to guide the addressee towards text-related instructional intentions" (2009: 163).

As Hyland (2004: 24) observes, directives (especially imperatives and deontic modal constructions) constitute potentially the most transparent type of engagement marking; they are used to engage the reader "in three main kinds of activity: textual, physical and cognitive". Cognitive acts guide the reader's process of thinking or seek to prescribe how the text/discourse at hand should be understood (Hyland 2004: 23–24). Textual directive acts draw the reader's attention to some other location of the text/discourse, whereas physical acts provide instruction in performing "some action in the real-world" (Hyland 2004: 23). An excerpt from the canon (extended caption) to the *Golden Table of Pythagoras* (Example 19) illustrates these engagement features in the context of a graphic device. The reader is first directed to "Take tente" ('pay attention') to a particular feature of the device. At the end of the passage, the cognitive faculties of the reader in operating the device are evoked in an expectation that the reader shall "preue it soþe" ('prove it correct'). This highlights the knowledge-constructing function of graphic devices. Example (19) also contains directives that instruct the reader in the operation of the device more concretely without an explicit reference to cognitive operations, such as "putte hem alle togidere, and þanne parte hem" ('put them all together, and then part them'). These instances reflect Hyland's textual and physical acts. Since the graphic device (sphere) to which the metadiscourse pertains is present in the text, but it may also be drawn by the reader in the 'real-world', the distinction between these two kinds of act is not altogether clear in this context. Notice also how at the beginning of the example the canon writer announces that they will now move from the description of the device to the part that explains what purpose the device serves:

(19) Now haue I told how þis spere was maad; now wolle I telle wherof it seruiþ. […] **Take tente** to þe day [...] & **take** þe noumbre of þe day as it is in þe spere [...] And **putte hem alle togidere, and þanne parte hem** [...] The noumbre [...] **þat þou schalt worche with, take** as þei stonde in þis nexte suynge figure or spere [...] & **þou schalt preue it soþe** truly [‘Now I have explained how this sphere was made; now I wish to explain what it serves for ... Pay attention to the day ... and take the number of the day as it is in the sphere ... And put them all together, and then part them ... The numbers ... that you shall work with, take them as they stand in this following figure or sphere ... and you shall prove it correct truly’] (canon to the second sphere of *The Golden Table of Pythagoras*, ed. Voigts 1994: 137)

Examples (20) and (21) illustrate the use of directives in texts in which the reader is instructed in the operation of a table-formatted calendar. In Example (20), the reader is asked to keep a piece of information in mind (Example 20); in Example (21), they should pay attention to a particularly demanding stage of the procedure of operating the graphic device. While the examples refer to elements in the text (“þis lessone” [‘this lesson’] and “þe rede lyne” [‘the red line’]), the reader’s desired act of paying attention is expressed through verbal phrases that involve cognitive processes or mental states such as forgetting (Example 20) or being conscious of something (Example 21, cf. *MED* s.v. *wăr(e)*, adj.).

(20) **forȝete not** þis lessone [‘do not forget this lesson’] (canon to an adapted version of John Somer’s *Kalendarium*, British Library MS Harley 937, f. 1v)

(21) **be ware þat ȝe go nat thorogh** þe rede lyne [‘observe that you do not go through the red line’] (canon to a lunary calendar, National Library of Wales, Brogyntyn MS ii.1, f. 11r)

In metadiscursive engagement of this kind, the presence of the addressee is typically made explicit through the use of what Hyland (2004: 20) calls “reader pronouns” (see also Boggel 2009: 166–174, Whitt 2018: 235–236, Peikola 2020). As shown by Examples (19) and (21) respectively, instructional metadiscourse in our material uses both *thou*- and *ye*-forms of second-person pronouns in addressing the user of the graphic device. The latter forms may sometimes be genuinely plural references, as in an adapted version of Somer’s *Kalendarium* where the canon begins with an address to “My soue*r*ayne maistres” (‘My worthy masters’) (British Library MS Harley 937, f. 1r). However, in most cases the context allows the interpretation of the *ye*-forms as polite singular uses that signal more distance between the discourse participants, as in Example (22) (for the complex semantic and pragmatic considerations potentially involved, see e.g. Jucker 2000, Buyle and Smet 2018).

(22) Takeþ {heed}[5] in þe first lyne on þe lyfte side for þe pryme. & þan goo toward þe right side til **ye** finde **yo*ur*** dominical lettre as for þe yere þ*at* **you** nedeþ [‘Take notice of the prime in the first column on the left, and then move toward the right side until you find your dominical letter for the year that you need’] (canon for the *Kalendarium* of John Somer, Oxford, Bodleian Library MS Ashmole 391, Part II, f. 1r)

While the engagement of the reader/user of the graphic device through second-person pronouns and imperatives dominates in our material, there are also verbal cues that employ more impersonal language (cf. Ädel 2006: 14 on *impersonal metadiscourse*). Example (23) illustrates a reference to the (general) reader as “a man”.

(23) þe which noumbre **muste be putt** to here lettris of þe propre name, **as a man may se** heraftir openly in figure [‘which number must be assigned to letters of the proper name, as one may see hereafter plainly in the figure’] (canon to the first sphere of *The Golden Table of Pythagoras*, ed. Voigts 1994: 134)

The user of the graphic device may also be engaged with first-person pronouns (see Ädel 2006: 30–31). In the mid-fifteenth-century canons for the *Kalendarium of John Somer* in MS Ashmole 391 (see Example 24), the pronoun *we* is used a few times in a way that suggests that the reference is *inclusive*, that is, comprising both the writer and the addressee. The usage thus explicitly brings to the fore both the reader-oriented and writer-oriented dimensions of metadiscourse (see Ädel 2017: 56, Fig. 1). As Hyland (2004: 20) points out, in contemporary academic writing the inclusive *we* is preferred in most disciplines over second-person pronouns because the latter “imply a detachment between the writer and reader, emphasising a counter-productive lack of involvement” (cf. Ädel 2017, who finds that *you* dominates over first-person pronouns in university teachers’ metadiscursive student feedback). In medieval Latin scientific texts, the pronoun *nos* (‘we’) typically excludes the addressee, and the same authoritative convention also characterises some ME translations from Latin, as observed by Taavitsainen (2000: 196). In Example (24), the author first exhorts the reader to calibrate the lunary volvelle and then warns them against mixing up its two pointers, changing the pronoun from *we* to *ye*. This subtle change from the first to the second person suggests that the scope of reference of the pronoun *we* here includes the addressee.

(24) Now set **we** þan þis lunary in his kynde/ Take **we** firste [...] & sette **we** [...] but loke þ*at* **ye** set not [...] [‘Let us now then set this lunary in its proper state. Let us first take ... and let us set ... but see

[5] The word is added above the line in red ink.

to it that you do not set...'] (canon for the *Kalendarium* of John Somer, Oxford, Bodleian Library MS Ashmole 391, Part II, f. 2v)

In her study of English medical metadiscourse between 1375 and 1550, Taavitsainen (2000) did not find any instances of this kind of inclusive use of *we*. She therefore surmises that this feature, which potentially signals a more active and authoritative role for the addressee, was a later development in medical metadiscourse (Taavitsainen 2000: 196; see however the study of metadiscourse in ME medical recipes by Quintana-Toledo 2009: 35, who exemplifies an inclusive use of *oure* 'our' in her material, albeit in the possibly conventionalised phrase "oure Lord" 'our Lord'). It may be speculated whether the scattered inclusive attestations of *we* in the version of Somer's *Kalendarium* illustrated in Example (24) belong to early signals anticipating the broader "change from a detached to more involved" style of scientific writing found to have taken place in the early modern period more generally (Taavitsainen 2000: 203). In fact, according to Taavitsainen, "[m]etadiscursive practices may provide the key to the overall stylistic change" (2000: 203).

In Ädel's model, the first-person singular *I* is a hallmark feature of the writer-oriented (*expressive*) function of metadiscourse (2006: 17–18, 30–31). For Hyland, such uses typically belong to *self-mentions* under the broader category of interactional metadiscourse (2018: 62–63). In our material, the first person singular pronoun occurs in some explanatory canons to graphic devices. It is largely limited to didactic passages where the writer illustrates the operation of the device by providing the reader with an example (however, see Example 19 above, at whose beginning first-person pronouns occur at a transition between structural units of text in a frame-marking function; see Hyland 2018: 59–60). In the two instances illustrated below (Examples 25 and 26), the didactic purpose of the usage is evident in how the writer first presents their own operation of the graphic device as a model performance that the reader should emulate. After offering the first-person example, the writer then explicitly notes that the reader should now do the same themselves, in this case successfully operating a Pythagorean sphere (25) or an astronomical calendar (26).

(25) Now **I schal sette an ensaumple** bi þe which **I may knowe & wite how I schal** worche [...] And riȝt so **schalt þou do** [...] ['I shall now provide an example by which I may know how I shall work ... And precisely in the same way shall you do...'] (canon to the first sphere of *The Golden Table of Pythagoras*, ed. Voigts 1994: 134–135)

(26) **Vnd*ir*stonde wele þis ensample**/ [...] **I** [...] lokyd i*n* **my** kalend*er* [...] and soghte **my** [...] and toke **my** [...] Þo turnyd **I** forth [...] & **I** fonde [...] þer*e*by demyd **I** [...] & **ȝow take ensample os** [sic] **I haue do** and loke ȝe kepe þe same thurgh all*e* þe table [‘Understand well this example... I ... looked in my calendar ... and sought my ... and took my ... Then I moved forward ... and I found ... thereby I judged ... and you take example as I have done and make sure that you keep the same throughout the table’] (canon to an adapted version of John Somer’s *Kalendarium*, British Library MS Harley 937, f. 1v)

In the case of MS Harley 937 (Example 26), the choice of the overly pedagogical format possibly reflected a tutor–student relationship of some kind between the writer and the intended audience of the manuscript. This is suggested by the argument of Mooney (1998: 63) that this version of Somer’s *Kalendarium* “may have been translated and prepared for the instruction of the sons of a northern noble family”. As for Example 25, the edition of the *Golden Table* by Voigts (1994) records interesting variation in pronoun choice between the manuscript witnesses of the text in this locus. In “bi þe which I may knowe […]” (‘by which I may know...’), four manuscripts replace the reading “I may” in Voigts’s base manuscript (as in Example 25) with “þu may” (‘thou may’), while one manuscript omits “I may” altogether, which makes the construction a directive (see the textual apparatus for line 70, Voigts 1994: 134). Similarly to Example 26, this variation highlights the potentially active role of late medieval redactors and scribes in shaping features of metadiscourse to accommodate their text to the requirements of the communicative situation.

6. Concluding remarks

Our findings suggest that ME metadiscourse associated with graphic devices may be usefully compared with the functions associated with image captions in modern science textbooks: to *identify* the device, to *describe* it and to *instruct* the reader in its operation. The basic functional level of the caption in identifying the device is especially typical of short verbal cues like titles, rubrics and headings that provide a label for the device. The identifying function also tends to be present at the beginning of longer cues such as canons and rules. These more substantive explanatory texts, however, then typically proceed into describing the device and taking the reader through its operation, in ways resembling the functions of extended captions in modern textbooks. In the description of the device, the reader’s attention is directed at its textual, visual and spatial organisation and appearance, including for example the naming of its parts and the colours used in its execution. Instructing the reader in the operation of the device often

makes use of second-person pronouns and directives to engage the reader. There are, however, also examples of captions that employ more impersonal metadiscourse.

The presence of evaluative strategies in some of the verbal cues surveyed might suggest, as a hypothesis to be explored in future research, that some of the graphic devices were still novelties whose adoption by the reader required persuasion by the text-producer. The highly detailed, even painstakingly procedural explanations associated with some of the graphic devices explored here might render further support to the impression about the relative inexperience of some of the users of the devices. A study by Reinking, Hayes and McEneaney (1988) on the use of verbal guidance for the interpretation of graphic devices in modern school textbooks shows that especially readers on a lower proficiency level may require more "explicit cueing" than more advanced graphical readers. Here, one is also usefully reminded by the findings of Means (1992: 623) about the general tendency to avoid references to charts and tables in ME popularised computistic material and to express a simplified version of their information instead, for example in mnemonic verses.

Our examination of the degree of proximity and relative hierarchy between the graphic device and instructive text associated with it serves to highlight the role played by the manuscript context on the macro level, including the physical realities of late medieval text-production that sometimes constrained the fulfilment of communicative goals. As suggested for example by the discussion of the zodiac man and the diagrams in Chaucer's *Treatise on the Astrolabe*, we may sometimes be faced with fundamental ontological questions concerning the primacy of text vs. image and the relationship between discourse and metadiscourse. While this study has focused on *verbal* cues, it seems clear that a more comprehensive understanding of late ME reader support in the interpretation of graphic devices would necessitate the inclusion of *visual* cues in the research design. In addition to paying attention to the visual articulation of textual and interpersonal pragmatic features on the manuscript page, for example along the lines of Carroll et al. (2013), research on visual metadiscourse and multimodal studies into the psychology of reading could provide us with useful concepts and findings to inform our future work.

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References

Ädel, Annelie. 2006. *Metadiscourse in L1 and L2 English*. Amsterdam: John Benjamins.

Ädel, Annelie. 2017. "*Remember that your reader cannot read your mind*: Problem/Solution-Oriented Metadiscourse in Teacher Feedback on Student Writing." *English for Special Purposes* 45: 54–68.

Ädel, Annelie, and Anna Mauranen. 2010. "Metadiscourse: Diverse and Divided Perspectives." *Nordic Journal of English Studies* 9 (2): 1–11.

Alonso-Almeida, Francisco. 2009. "Stance Marking and Register in Middle English Charms." *Studia Anglica Posnaniensia* 45 (1): 13–29.

Alonso-Almeida, Francisco, and Margarita Mele-Marrero. 2014. "Stancetaking in Seventeenth-Century Prefaces on Obstetrics". *Journal of Historical Pragmatics* 15 (1): 1–35.

Al-Subhi, Aisha Saadi. 2021. "Metadiscourse in Online Advertising: Exploring Linguistic and Visual Metadiscourse in Social Media Advertisements." *Journal of Pragmatics* 187: 24–40.

Anesa, Patrizia, and Ilaria Fornasini. 2017. "The Modernity of Middle English Manuscripts: A Multimodal Investigation." *Elephant & Castle* 17: 5–41. Available at https://aisberg.unibg.it/handle/10446/111370#.YBkfn-fRbIU.

Bateman, John A. 2008. *Multimodality and Genre. A Foundation for the Systematic Analysis of Multimodal Documents*. Basingstoke: PalgraveMacmillan.

Bateman, John A. 2009. "Discourse across Semiotic Modes." In *Discourse, of Course: An Overview of Research in Discourse Studies*, edited by Jan Renkema, 55–66. Amsterdam: John Benjamins.

Bernard, Robert M. 1990. "Using Extended Captions to Improve Learning from Instructional Illustrations." *British Journal of Educational Technology* 21 (3): 215–225.

Biber, Douglas. 2004. "Historical Patterns for the Grammatical Marking of Stance." *Journal of Historical Pragmatics* 5 (1): 107–136.

Boggel, Sandra. 2009. *Metadiscourse in Middle English and Early Modern English Religious Texts*. Frankfurt am Main: Peter Lang.

Bös, Birte. 2017. "Of Hopes and Plans: Newsmakers' Metadiscourse at the Dawn of the Newspaper Age." In *Diachronic Developments in English News Discourse*, edited by Minna Palander-Collin, Maura Ratia, and Irma Taavitsainen, 15–37. Amsterdam: John Benjamins.

Busse, Ulrich, and Axel Hübler (eds.). 2012. *Investigations into the Meta-Communicative Lexicon of English: A Contribution to Historical Pragmatics*. Amsterdam: John Benjamins.

Buyle, Anouk, and Hendrik De Smet. 2018. “Meaning in a Changing Paradigm: The Semantics of *you* and the Pragmatics of *thou*.” *Language Sciences* 68: 42–55.

Carroll Ruth, Matti Peikola, Hanna Salmi, Mari-Liisa Varila, Janne Skaffari, and Risto Hiltunen. 2013. “Pragmatics on the Page: Visual Text in Late Medieval English Books.” *European Journal of English Studies* 17 (1): 54–71.

Chaemsaithong, Krisda. 2013. “Interaction in Early Modern News Discourse: The Case of English Witchcraft Pamphlets and Their Prefaces (1566–1621).” *Text & Talk* 33 (2): 167–188.

Crawford, Matthew R. 2019. *The Eusebian Canon Tables: Ordering Textual Knowledge in Late Antiquity*. Oxford: Oxford University Press.

Crismore, Avon. 1989. *Talking with Readers: Metadiscourse as Rhetorical Act*. New York: Peter Lang.

Domínguez-Rodríguez, M. Victoria, and Alicia Rodríguez-Álvarez. 2015. “Metacomments in the Prefaces to English School Grammars of the Eighteenth Century.” *Journal of Historical Pragmatics* 16 (1): 86–108.

Eagleton, Catherine. 2007. “‘Chaucer’s own astrolabe’: Text, Image and Object.” *Studies in History and Philosophy of Science* 38: 303–326.

Eagleton, Catherine, and Matthew Spencer. 2006. “Copying and Conflation in Geoffrey Chaucer’s *Treatise on the Astrolabe*: A Stemmatic Analysis Using Phylogenetic Software.” *Studies in History and Philosophy of Science* 37: 237–268.

Eisner, Sigmund (ed.). 2002. *Geoffrey Chaucer. A Treatise on the Astrolabe*. Norman: University of Oklahoma Press.

Falk, Seb. 2016. “Learning Medieval Astronomy through Tables: The Case of the *Equatorie of Planetis*.” *Centaurus* 58: 6–25.

Flowerdew, John. 2015. “Revisiting Metadiscourse: Conceptual and Methodological Issues Concerning Signalling Nouns.” *Ibérica* 29: 15–34.

Fuertes-Olivera, Pedro A., Marisol Velasco-Sacristán, Ascensión Arribas-Baño, and Eva Samaniego-Fernández. 2001. “Persuasion and Advertising English: Metadiscourse in Slogans and Headlines.” *Journal of Pragmatics* 33: 1291–1307.

Gottschall, Anna. 2008. “The Lord’s Prayer in Circles and Squares: An Identification of Some Analogues of the Vernon Manuscript’s Pater Noster Table.” *Marginalia* 7: [n.p.]. Available at http://merg.soc.srcf.net/journal/08confession/circles.php

Grund, Peter J. 2021. *The Sociopragmatics of Stance. Community, Language, and the Witness Depositions from the Salem Witch Trials*. Amsterdam: John Benjamins.

Hiippala, Tuomo, and John A. Bateman. 2020. “Introducing the Diagrammatic Mode.” *arXiv* 2001.11224. Available at https://arxiv.org/abs/2001.11224.

Hyland, Ken. 1998. “Persuasion and Context: The Pragmatics of Academic Metadiscourse.” *Journal of Pragmatics* 30: 437–455.

Hyland, Ken. 2004. “Engagement and Disciplinarity: The Other Side of Evaluation.” In *Academic Discourse – New Insights into Evaluation*, edited by Gabriella del Lungo Camiciotti, and Elena Tognini Bonelli, 13–30. Bern: Peter Lang.

Hyland, Ken. 2017. “Metadiscourse: What Is It and Where Is It Going?.” *Journal of Pragmatics* 113: 16–29.

Hyland, Ken. 2018. *Metadiscourse: Exploring Interaction in Writing*. 2nd ed. London: Bloomsbury.

Hyland, Ken, and Polly Tse. 2004. “Metadiscourse in Academic Writing: A Reappraisal.” *Applied Linguistics* 25: 156–177.

Ifantidou, Elly. 2005. “The Semantics and Pragmatics of Metadiscourse.” *Journal of Pragmatics* 37: 1325–1353.

Jones, Peter Murray. 2016. “Image, Word, and Medicine in the Middle Ages.” In *Visualizing Medieval Medicine and Natural History, 1200–1550*, edited by Jean A. Givens, Karen M. Reeds, and Alain Touwaide, 1–24. London: Routledge. First published 2006 by Ashgate.

Jucker, Andreas H. 2000. “*Thou* in the History of English: A Case for Historical Semantics or Pragmatics?” In *Words: Structure, Meaning, Function. A Festschrift for Dieter Kastovsky*, edited by Christiane Dalton-Puffer, and Nikolaus Ritt, 153–163. Berlin: Mouton de Gruyter.

Kaltenböck, Gunther, María José López-Couso, and Belén Méndez-Naya. 2020. “The Dynamics of Stance Constructions.” *Language Sciences* 82: 1–12.

Keiser, George R. 1998. “Works of Science and Information.” In *A Manual of the Writings in Middle English 1050-1500*, vol. 10, edited by Albert E. Hartung, 3593–3967. New Haven: The Connecticut Academy of Arts and Sciences.

Kembhavi, Aniruddha, Mike Salvato, Eric Kolve, Minjoon Seo, Hannaneh Hajishirzi, and Ali Farhadi. 2016. “A Diagram is Worth a Dozen Images.” In *Computer Vision – ECCV 2016. 14th European Conference, Amsterdam, The Netherlands, October 11–14, 2016, Proceedings, Part IV*, edited by Bastian Leibe, Jiri Matas, Nicu Sebe, and Max Welling, 235–251. Cham: Springer.

Kennedy, Kathleen E. 2014. “Reintroducing the English Books of Hours, or ‘English Primers’.” *Speculum* 89 (3): 693–723.

Kumpf, Eric P. 2000. “Visual Metadiscourse: Designing the Considerate Text.” *Technical Communication Quarterly* 9 (4): 401–424.

Marchese, Francis T. 2013. “Tables and Early Information Visualization.” In *Knowledge Visualization Currents*, edited by Francis T. Marchese, and Ebad Bannissi, 35–61. London: Springer.

Mauranen, Anna. 1993. *Cultural Differences in Academic Rhetoric: A Textlinguistic Study*. Frankfurt am Main: Peter Lang.

Means, Laurel. 1992. “‘Ffor as moche as yche man may not haue þe astrolabe’: Popular Middle English Variations on the Computus.” *Speculum* 67 (3): 595–623.

Middle English Dictionary. https://quod.lib.umich.edu/m/middle-english-dictionary/dictionary.

Mooney, Linne R. 1995. *The Index of Middle English Prose. Handlist XI: Manuscripts in the Library of Trinity College, Cambridge*. Cambridge: D. S. Brewer.

Mooney, Linne R. (ed.). 1998. *The Kalendarium of John Somer*. Athens: The University of Georgia Press.

Murdoch, John E. 1984. *Album of Science: Antiquity and the Middle Ages*. New York: Charles Scribner's Sons.

Obrist, Barbara. 2020. "The Idea of a Spherical Universe and Its Visualization in the Earlier Middle Ages (Seventh to Twelfth Century)." In *The Visualization of Knowledge in Medieval and Early Modern Europe*, edited by Marcia Kupfer, Adam S. Cohen, and J. H. Chajes, 229–258. Turnout: Brepols.

Oxford English Dictionary. https://www.oed.com.

Pahta, Päivi, and Irma Taavitsainen. 2004. "Vernacularisation of Scientific and Medical Writing in Its Sociohistorical Context." In *Medical and Scientific Writing in Late Medieval English*, edited by Irma Taavitsainen, and Päivi Pahta, 1–22. Cambridge: Cambridge University Press.

Peikola, Matti. 2013. "Tables of Lections in Manuscripts of the Wycliffite Bible." In *Form and Function in the Late Medieval Bible*, edited by Eyal Poleg, and Laura Light, 351–378. Leiden: Brill.

Peikola, Matti. 2020. "Patterns of Reader Involvement on Sixteenth-Century English Title Pages, with Special Reference to Second-Person Pronouns." In *Voices Past and Present – Studies of Involved, Speech-Related and Spoken Texts. In Honor of Merja Kytö*, edited by Ewa Jonsson, and Tove Larsson, 113–129. Amsterdam: John Benjamins.

Peikola, Matti, and Birte Bös (eds.). 2020. *The Dynamics of Text and Framing Phenomena: Historical Approaches to Paratext and Metadiscourse in English*. Amsterdam: John Benjamins.

Peikola, Matti, and Mari-Liisa Varila. 2023. "Multimodal and Multilingual Practices in Late Medieval English Calendars." In *Multilingualism from Manuscript to 3D: Intersections of Modalities from Medieval to Modern Times*, edited by Matylda Włodarczyk, Jukka Tyrkkö, and Elżbieta Adamczyk, 93–118. New York: Routledge.

Pozzer-Ardenghi, Lilian, and Wolff-Michael Roth. 2010. "Toward a Social Practice Perspective on the Work of Reading Inscriptions in Science Texts." *Reading Psychology* 31: 228–253.

Purchase, Helen C. 2014. "Twelve Years of Diagrams Research." *Journal of Visual Languages and Computing* 25: 57–75.

Quintana-Toledo, Elena. 2009. "Middle English Medical Recipes: A Metadiscursive Approach." *Studia Anglica Posnaniensia* 45 (2): 21–38.

Rand, Kari Anne. 2014. *Index of Middle English Prose: Index to Volumes I to XX*. Cambridge: Boydell & Brewer.

Rand Schmidt, Kari Anne. 1993. *The Authorship of the* Equatorie of the Planetis. Cambridge: D. S. Brewer.

Reinking, David, David A. Hayes, and John E. McEneaney. 1988. “Good and Poor Readers’ Use of Explicitly Cued Graphic Aids.” *Journal of Reading Behavior* 20 (3): 229–247.

Sandler, Lucy Freeman. 1983. *The Psalter of Robert de Lisle in the British Library*. London: Harvey Miller.

Scott, Kathleen L. (general editor). 2000–. *An Index of Images in English Manuscripts from the Time of Chaucer to Henry VIII*. London and Turnhout: Harvey Miller.

Severs, J. Burke, Albert E. Hartung, and Peter G. Beidler (eds). 1967–2005. *A Manual of the Writings in Middle English, 1050–1500*. 11 vols. New Haven: The Connecticut Academy of Arts and Sciences.

Slough, Scott W., Erin M. McTigue, Suyeon Kim, and Susan K. Jennings. 2010. “Science Textbooks’ Use of Graphical Representation: A Descriptive Analysis of Four Sixth Grade Science Texts.” *Reading Psychology* 31 (3): 301–325.

Smith, Jordan. 2020. “A Content Analysis of Figure Captions in Academic Journals from Four Disciplines.” *IEEE Transactions on Professional Communication* 63 (4): 341–360.

Taavitsainen, Irma. 2000. “Metadiscursive Practices and the Evolution of Early English Medical Writing 1375–1550”, in *Corpora Galore: Analyses and Techniques in Describing English*, edited by John M. Kirk, 191–207. Amsterdam: Rodopi.

Taavitsainen, Irma. 2006. “Audience Guidance and Learned Medical Writing in Late Medieval English.” In *Advances in Medical Discourse Analysis: Oral and Written Contexts*, edited by Maurizio Gotti, and Françoise Salager-Meyer, 431–456. Frankfurt am Main: Peter Lang.

Taavitsainen, Irma, and Turo Hiltunen. 2012. “*Now* as a Text-Deictic Feature in Late Medieval and Early Modern English Medical Writing.” In *Investigations into the Meta-Communicative Lexicon of English: A Contribution to Historical Pragmatics*, edited by Ulrich Busse, and Axel Hübler, 179–205. Amsterdam: John Benjamins.

van Gog, Tamara. 2021. “The Signaling (or Cueing) Principle in Multimedia Learning.” In *The Cambridge Handbook of Multimedia Learning*, 3rd ed., edited by Richard E. Mayer, and Logan Fiorella, 221–230. Cambridge: Cambridge University Press.

Vande Kopple, William J. 1985. “Some Exploratory Discourse on Metadiscourse.” *College Composition and Communication* 36 (1): 82–93.

Varila, Mari-Liisa. 2020. “Book Producers’ Comments on Text-Organization in Early 16th-Century Printed Paratexts.” In *The Dynamics of Text and Framing Phenomena: Historical Approaches to Paratext and Metadiscourse in English*, edited by Matti Peikola, and Birte Bös, 209–239. Amsterdam: John Benjamins.

Voigts, Linda Ehrsam. 1986. “The Latin Verse and Middle English Prose Texts on the Sphere of Life and Death in Harley 3719.” *The Chaucer Review* 21 (2): 291–305.

Voigts, Linda Ehrsam. 1989. “Scientific and Medical Books.” In *Book Production and Publishing in Britain 1375–1475*, edited by Jeremy Griffiths, and Derek Pearsall, 345–402. Cambridge: Cambridge University Press.

Voigts, Linda Ehrsam. 1994. “The Golden Table of Pythagoras.” In *Popular and Practical Science of Medieval England*, edited by Lister M. Matheson, 123–139. East Lansing: Michigan State University Press.

Voigts, Linda Ehrsam, and Patricia Deery Kurtz. 2019. *Scientific and Medical Writings in Old and Middle English: An Electronic Reference CD*. An extended and revised online version. Originally published in 2000. Ann Arbor: University of Michigan Press. Available at http://cctr1.umkc.edu/search; accessed through https://www.medievalacademy.org/page/Books#etk.

Wallis, Faith. 2015. “What a Medieval Diagram Shows: A Case Study of *Computus*.” *Studies in Iconography* 36: 1–40.

Whitt, Richard J. 2018. “‘And all this is spoken of the naturall byrth…’: Metadiscourse in *The Birth of Mankind* and Its German Source Text, *Rosengarten*.” *English Text Construction* 11 (2): 225–255.

Wieck, Roger S. 2017. *The Medieval Calendar. Locating Time in the Middle Ages*. New York: The Morgan Library & Museum in association with Scala Arts Publishers.

Witherden, Sian. 2017. “Balancing Form, Function, and Aesthetic: A Study of Ruling Patterns for Zodiac Men in Astro-Medical Manuscripts of Late Medieval England.” *Journal of the Early Book Society for the Study of Manuscripts and Printing History* 20: 79–109.

Wright, Patricia. 1981. “Tables in Text: The Subskills Needed for Reading Formatted Information.” *The Reader and the Text. Proceedings of the Seventeenth Annual Course and Conference of the United Kingdom Reading Association University of Warwick, 1980*, edited by L. John Chapman, 60–69. London: Heinemann Educational Books.

Appendix

The list below shows the manuscripts consulted from each repository, alphabetised by the location of the repository. Information about the relevant text(s) in each manuscript has been given in parentheses after the manuscript shelfmark; foliation has been indicated for short items that are not main texts of the manuscript. The manuscripts accessed via digitised online facsimiles made available by the repository have been furnished with an asterisk. The list also contains some monolingual Latin items that were inspected in order to facilitate our understanding of their corresponding vernacularised versions (especially copies of the *Kalendarium* of John Somer, see Mooney 1998). For manuscripts marked with (n) we only have our written notes based on the inspection of the manuscript *in situ*, but no images. In addition to the manuscripts listed below, we consulted copies of different redactions of the tables of lessons found in manuscripts of the Wycliffite Bible that are furnished with instructing rubrics (canons); for these redactions and their manuscripts, see Peikola (2013).

Aberystwyth, The National Library of Wales

Brogyntyn ii.1 (table/calendar canons, ff. 5v, 6v, 11r)*

Cambridge

St John's College G.24 (Easter table, f. 7r)

Trinity College O.5.26 (John of Seville's interpretation of Al-Quabisi, ff. 1r–27v; William of English's treatise on medical astrology, ff. 30r–39v; *The Newe Theorik of Planetis*, ff. 125r–152v; Richard of Wallingford's *Exafrenon*, ff. 171r–181r; foliation as given by Mooney 1995: 116–121)*

Glasgow, University of Glasgow, Hunterian Library

512 (Easter table, ff. 10r–11r)

London, The British Library

Additional 4698 (Pythagorean table/sphere, f. 2r–v)
Additional 10106 (doctrinal table, ff. 39v–44r)
Additional 10628 (*Kalendarium* of John Somer) (n)
Additional 15209 (*Kalendarium* of John Somer, *Kalendarium* of Nicholas Lynne)
Additional 17358 (*Kalendarium* of John Somer) (n)
Additional 23002 (Chaucer's *Treatise on the Astrolabe*)
Additional 27592 (Easter table with canon, f. 4r)
Additional 29250 (Chaucer's *Treatise on the Astrolabe*)
Cotton Faustina A II (*Kalendarium* of John Somer) (n)
Cotton Vespasian E VII (*Kalendarium* of John Somer)
Cotton Vitellius A I (*Kalendarium* of John Somer) (n)
Egerton 2622 (Chaucer's *Treatise on the Astrolabe, The Crafte of Nombrynge*)
Harley 321 (*Kalendarium* of John Somer)*
Harley 937 (*Kalendarium* of John Somer)*
Harley 1785 (*Kalendarium* of John Somer)
Harley 3719 (Pythagorean table/sphere, ff. 175v–177v)*
Harley 5311 (*Kalendarium* of John Somer)*
Royal 2 B VIII (*Kalendarium* of John Somer) (n)
Royal 12 D VI (canon of Walter Anglus, alias John Walter, f. 81r)
Royal 12 E XVI (*Kalendarium* of John Somer; canons for Easter and moveable feast tables, ff. 11r–12r) (n)
Sloane 282 (*Kalendarium* of John Somer) (n)
Sloane 261 (Chaucer's *Treatise on the Astrolabe*)
Sloane 314 (Chaucer's *Treatise on the Astrolabe*)
Sloane 389 (Pythagorean table/sphere, ff. 93r–95v)
Sloane 807 (*Kalendarium* of John Somer)*
Sloane 2250 (*Kalendarium* of John Somer)*
Sloane 2397 (*Kalendarium* of John Somer)
Sloane 2465 (*Kalendarium* of John Somer) (n)
Sloane 3526 (canon to Pythagorean table/sphere, ff. 6v–7v)
Sloane 3580A (Pythagorean table/sphere, ff. 3r–5r)

Manchester, Chetham's Library

Mun.A.4.99. (planetary table with canon, ff. 19r–20r)*

New Haven, Yale University
The Beinecke Rare Book & Manuscript Library
558 (astronomical, prognosticatory and other tables)
Takamiya 95 (planetary table with canon, ff. 1v–14r)*

Oxford, Bodleian Library
Ashmole 391, Part II (canon to *Kalendarium* of John Somer, ff. 1r–4v)
Ashmole 393, Part II (calendar canons, ff. 9r–10v)
Douce 246 (Easter table with canon, ff. 1r–3r) (n)
Eng. poet. a. 1 (‘Pater noster’ table/diagram, f. 231v)*
Wood D. 8 (table of moveable feasts, ff. 19v–20v) (n)