10.20378/irb-57634

Qibla Schemes as Text-Image Arrangements by an Example from 13th Century Yemen

al-Ashraf ʿUmar's *Tabṣira*, Chapter xxxvii.1.

Petra G. Schmidl[1]

Abstract

Qibla schemes facilitate finding the direction to the Kaʿba in Mecca from different localities by simple and approximate means, regardless of whether they provide their information in running texts or as text-image arrangements. This article introduces a cluster of *qibla* schemes found in three Yemeni sources from 13th and early 14th century after briefly outlining the principles behind this procedure, its manifestations and its developments. The focus will be on al-Ashraf ʿUmar's *Kitāb al-Tabṣira fī ʿilm al-nujūm* including Arabic text and English translation of one of the *qibla* schemes presented in this treatise. Finally, some preliminary observations will be drawn by comparing these *qibla* schemes, mainly based on the simultaneous emergence of them in running texts and as text-image arrangements.

1. *Qibla* Schemes as Text-Image Arrangements

1.1 Text-image arrangements in pre- and early modern Arabic astronomical and astrological sources

Pre- and early modern Arabic, Persian and Ottoman manuscripts of astrological and astronomical contents include a wide variety of text-image arrangements that belong to a similar wide variety of treatises,[2] such as

[1] I would particularly like to thank Lorenz Korn and Berenike Metzler, who invited me to contribute to this volume although I missed the conference. Furthermore, I would like to express my gratitude to all colleagues who helped me in improving this paper, in particular Thony Christie, Klaus Herbers for his support, David A. King for kindly providing me with his research on sacred geography, Flora Favea for her efforts, and last but not least Martin M. Schmidl for his sympathy. The responsibility for the content falls entirely upon the author of this present text. This article belongs to a series by this author all dealing with different aspects of the *Tabṣira* and its author al-Ashraf ʿUmar (cf. also https://tabsira.hypotheses.org/ [last viewed 20.05.2022]).

[2] For an overview of pre-modern and early modern astronomy and astrology in Islamic societies, cf. for example, Ragep, F. Jamil: "Astronomy". In: *Encyclopaedia of Islam*, THREE. Burnett,

(1) astrological texts, introductory as well as specialized literature, comprising all its branches, e. g., horoscopes, elections, and interrogations,

(2) cosmological and philosophical literature mainly dealing with the structure of the universe,

(3) *anwāʾ* and *azmina* texts as well as treatises of similar contents that present what modern research denotes as folk astronomical traditions, e. g., almanacs and calendars,

(4) texts providing practical aspects of astronomy, *zīj*es, i. e., astronomical-astrological handbooks with tables, timekeeping *corpora*, books on the constellations or on the construction and use of instruments,

(5) and those with an interest in theoretical problems, in particularly those belonging to the *hayʾa* tradition.

The text-image arrangements these sources present are of similar wide variety. They range from running texts, either plain, procedural, recipe-like or others, lists, numerical and non-numerical one- and double-argument tables, schemes, diagrams, charts and maps to illustrations and miniatures.[3] The most famous of these text-image arrangements might be depictions taken from one of the manuscripts of the *Kitāb al-Ṣuwar* ("Book of constellations") by ʿAbd al-Raḥmān al-Ṣūfī (d. 986), the chart with the horoscope of Sulṭān Iskandar (d. 1415), a grand-son of Tīmūr Lang (d. 1405), and the miniature depicting the observatory of Taqī al-Dīn (d. 1585) in Istanbul. They are widely used on book covers and web pages dealing with pre- and early modern astronomy and astrology in Islamicate societies as well as on flyers and posters announcing lectures, exhibitions, and the like.[4]

Charles: "Astrology". In: *Encyclopaedia of Islam*, THREE and the literature there mentioned; Schmidl, Petra G.: "Astral Sciences. Traditions and Practices in the Medieval Islamic world". In: *Prognostication in the Medieval World. A Handbook*. Eds. Klaus Herbers – Matthias Heiduk – Hans-Christian Lehner. Berlin: de Gruyter, 2021, pp. 532–550.

[3] There are no systematic overviews of the different kinds of text-image arrangements in pre- and early modern Arabic, Persian, and Ottoman manuscripts of astronomical and astrological contents. However, museum, library and exhibition catalogues, coffee-table books and digitalisations of manuscripts allow a good impression, cf. for example, Porter, Yves et al. (eds.): *Images of Islamic Science. Illustrated Manuscripts from the Iranian World* (Bibliothèque iranienne 67). Téhéran: Institut français de recherche en Iran, 2009, pp. 68–181; *L'âge d'or des sciences arabes. Exposition présentée à l'Institut du Monde Arabe, Paris 25 octobre 2005 – 19 mars 2006*. Paris: Institut du Monde Arabe, 2005, pp. 80–139; the rich appendix of King, David A.: *Survey of the Scientific Manuscripts in the Egyptian National Library*. Winona Lake, Indiana: Eisenbrauns, 1986. Partially related to the topic are the ongoing projects "Visual Organisation" at the Centre for the Studies of Manuscript Cultures (CSMC) in Hamburg (https://www.manuscript-cultures.uni-hamburg.de/Projekte_p2_e.html#PBB (last viewed 30. 03. 2020)) and "Visualisation of the Heavens" at the Max Planck Institute for the History of Science in Berlin (https://www.mpiwg-berlin.mpg.de/research/projects/visualization-and-material-cultures-heavens-image-database-eurasia-and-north (last viewed 30. 03. 2020)).

[4] For images found in the various manuscripts of al-Ṣūfī's *Book of Constellations*, e. g., https://ismi.mpiwg-berlin.mpg.de/text/172144 (last viewed 30. 03. 2020); Strohmaier, Gotthard: *Die Sterne des Abd ar-Rahman as-Sufi*. Leipzig, Weimar: Gustav Kiepenheuer, 1984; for further

1.2 *Qibla* schemes as text-image arrangements

Qibla schemes provide one example of such an text-image arrangement found in pre-modern astronomical and related sources.[5] They allow the determination of the direction to the Kaʿba in Mecca, of prime importance for Muslim ritual prayers and further religious obligations,[6] by simple and approximate means, in modern research often described as folk astronomical procedures or denoted as sacred geography.[7] Besides these *qibla* schemes, since the ninth century mathematical methods were developed that deal with the determination of the *qibla* as a problem of spherical astronomy.[8] Together with the determination of the five daily ritual prayers and the first sighting of the lunar crescent it constitutes what David A. King calls "astronomy in the service of Islam,"[9] a branch of pre-modern knowledge where religious obligations and astronomical solutions meet.

Principles

Determining the direction to the Kaʿba in Mecca by these schemes is based on three principles:[10]

---

reading, e. g., Kunitzsch, Paul: "The Astronomer Abu 'l-Ḥusayn al-Ṣūfī and his *Book on the Constellations*". *Zeitschrift für Geschichte der arabisch-islamischen Wissenschaften* 3 (1986), pp. 56–81. – For a book cover using the Iskandar horoscope preserved in the Wellcome Collection, London (MS Persian 474), e. g., App, Urs et al. (eds.): *Orakel – Der Blick in die Zukunft. Sonderausstellung zur Jahrtausendwende im Museum Rietberg, Zürich 14.12.1999–2.12.2000*. Museum Rietberg: Zürich, 1999; for an image https://wellcomecollection.org/works/kx424333 (last viewed 30. 02. 2020); for further reading, e. g., Caiozzo, Anna: "The Horoscope of Iskandar Sultan as a Cosmological Vision in the Islamic world". In: *Horoscopes and Public Spheres. Essays on the History of Astrology* (Religion and society 42). Eds. Günther Oestmann et al. Berlin, New York: Walter de Gruyter, 2005, pp. 115–138. – For a book cover using the Istanbul observatory, e. g., *Häuser der Weisheit. Wissenschaft im Goldenen Zeitalter des Islam*. Mainz: Nünnerich-Asmus, 2015; for further reading Fazlıoğlu, İhsan: "Taqī al-Dīn". In: *The Biographical Encyclopedia of Astronomers*. Eds. Thomas Hockey et al. New York: Springer, 2007, pp. 1122a–1123b.

[5] Photos of some examples are published in King, David A.: *World-maps for Finding the Direction and Distance to Mecca. Innovation and Tradition in Islamic Science* (Islamic philosophy, theology and science 36). Leiden: Brill 1999, pp. 52–55, figs. 2.3.1–2.3.4; King, David A.: "Makka iv: As the Centre of the World". In: *The Encyclopaedia of Islam. New Edition*, 12 volumes and indices. Leiden: Brill 1960–2009, vol. 6 (1991), pp. 180b–187a, pl. V–X.

[6] For more details, e. g., Wensinck, Arent J.: "Ḳibla. i. Ritual and Legal Aspects". In: *EI2*, vol. 5 (1986), pp. 82a–83a.

[7] King, *World-Maps*, pp. 47–55; King 1991, and the literature there cited.

[8] Van Brummelen, Glen: *Heavenly Mathematics. The Forgotten Art of Spherical Trigonometry*. Princeton/Oxford: Princeton University Press, 2013, pp. 66–71; King, *World-Maps*, 1999, pp. 56–64; King, David A.: "Ḳibla ii. Astronomical aspects". In: *EI2*, vol. 5 (1986), pp. 83a–88b and the literature there cited.

[9] King, David A.: "Astronomie im Dienste des Islam". In: *Ad radices. Festband zum fünfzigjährigen Bestehen des Instituts für Geschichte der Naturwissenschaften der Johann Wolfgang Goethe-Universität Frankfurt am Main*. Ed. Anton von Gotstedter. Franz Steiner: Stuttgart, 1994, pp. 99–124; also King, David A.: "Folk Astronomy in the Service of Religion: The Case of Islam". In: *Astronomies and Cultures*. Eds. Clive L. N. Ruggles – Nicholas J. Saunders. Colorado: University Press of Colorado, 1993, pp. 124–138 and King, David A.: *Astronomy in the Service of Islam* (Variorum collected studies series 416). Aldershot: Variorum, 1993.

[10] For more details Herrera-Casais, Mónica – Petra G. Schmidl: "The Earliest Known Schemes of Islamic Sacred Geography". In: *Islamic Thought in the Middle Ages. Studies in Text,*

(1) The Kaʿba is considered the centre of the inhabited world that is divided into sectors around it.[11] Each is associated with a segment of its perimeter.

(2) The cube-shaped edifice in Mecca is astronomically aligned. The four corners of the Kaʿba point roughly to the four cardinal directions and are named accordingly. Its four walls are associated with the four cardinal winds whose boundaries are defined by astronomical horizon phenomena.[12]

(3) The directions that the *qibla* schemes describe by means of astronomical phenomena pertaining to the horizon and the winds, are intended to face the segment of the perimeter of the Kaʿba that is associated with one's locality, as if one were standing directly in front of that part of the edifice in Mecca.[13]

Developments

David King has identified about forty *qibla* schemes based on these principles in sources from the 9th to the 19th century, and these being the tip of the iceberg, as he assumes.[14] They appear in specialized literature on the subject, the *kutub dalāʿil al-qibla*, in texts on folk, but also on navigational and mathematical astronomy, however not as an integral part, in almanacs, instrument books, geographical, cosmographical, historiographical, and legal treatises as well as in encyclopaedias.[15]

The oldest known and rather simple example from the 9th century is found in the geographical treatise *Kitāb al-Masālik wa l-mamālik* ("The Book of itineraries and kingdoms") written between *ca.* 846 and 885 by Abū al-Qāsim ʿUbayd Allāh b. Khurradādhbih (fl. second half of 9th c.), a scholar from the region of modern

Transmission and Translation, in Honour of Hans Daiber. Eds. Anna Akasoy – Wim Raven (Islamic philosophy, theology and science 75). Leiden/Boston: Brill, 2008, pp. 275–300.

[11] Also Wensinck, Arent J.: "Kaʿba". In: *The Encyclopaedia of Islam*. 4 volumes. Leiden/London: Brill, 1913–1936. Photomechanical reprint in 9 volumes. Leiden: Brill, 1987, vol. 4, p. 590a.

[12] Also Schmidl, Petra G.: *Volkstümliche Astronomie im islamischen Mittelalter. Zur Bestimmung der Gebetszeiten und der Qibla bei al-Aṣbaḥī, Ibn Raḥīq und al-Fārisī* (Islamic philosophy, theology and science 68). Leiden: Brill, 2007, pp. 342–345 (Arabic text with German translation), pp. 637–642 (study); Hawkins, Gerald S. – David A. King: "On the Orientation of the Kaʿba". *Journal for the History of Astronomy* 13 (1982), pp. 102–109; non the winds also Schmidl, Petra G.: "Zur Bestimmung der Qibla mittels der Winde". In: *Der Weg der Wahrheit. Aufsätze zur Einheit der Wissenschaftsgeschichte*. Festgabe zum 60. Geburtstag von Walter G. Saltzer. Eds. Peter Eisenhardt – Frank Linhard – Kaisar Petanides. Hildesheim, New York: Georg Olms, 1999, pp. 135–146.

[13] For more details and background information, e. g., King 1991, pp. 182a–182b.

[14] King, David A.: "Islamic Sacred Geography and Finding the *qibla* by the Sun and Stars: A Survey of the Historical Sources with an Appendix on Some Recent Fallacies Concerning Mosque Orientations". *Zeitschrift für Geschichte der arabisch-islamischen Wissenschaften* (2020), pp. 91–141), sub "Index of authors on Islamic sacred geography".

[15] King 2020, sub "Index"; also King 1991, pp. 183a–185b.

Iran and Iraq. He wrote several treatises that might belong to a courtly context, according to their titles.[16] The *qibla* scheme associates four segments of the perimeter of the Kaʿba with four sets of localities, or rather their inhabitants, and describes the direction to Mecca for them by means of the cardinal directions. For the inhabitants of the Yemen, it reads:

وأمّا قبلة أهل اليمن فصلاتهم إلى الركن اليماني وجوههم إلى وجوه أهل أرمينية إذا صلّوا

> "The *qibla* for the peoples in the Yemen: they pray towards the Yemeni corner, with their faces opposite to the faces of the people of Armenia when they (also) pray [it is to the wall of the Kaʿba where the door is located, between the North Pole to the left of (the wall) as far as due east]."[17]

To fulfil the task of finding the direction to the Kaʿba in Mecca, however, Ibn Khurradādhbih does not arrange these four sectors graphically around the Kaʿba as the term *qibla* scheme might suggest.[18] Instead, he provides them in a simple running text with some linguistic inconsistencies.[19]

Another example that provides the information on the determination of the *qibla* in a running text, this time with eight sectors and not exactly that early, is included in a treatise of folk astronomical contents with the uncomplete title *...ʿalā madhāhib al-ʿArab* ("... according to the knowledge of the Arabs"). It is most probably written in 11th century Hijāz by Abū ʿAbd Allāh Muḥammad b. Raḥīq b. ʿAbd al-Karīm (fl. 11th c.),[20] who attributes the *qibla* scheme to Muḥammad b. Surāqa al-ʿĀmirī (d. 1019), a legal scholar from the Yemen who is associated with two further schemes.[21] While Ibn Khurradādhbih relies on the cardinal directions to describe the directions to the Kaʿba in Mecca, Ibn Surāqa uses astronomical horizon phenomena and the winds, that need to be positioned at a specific part of the

[16] On Ibn Khurradādhbih and his oeuvre, e. g., Hadj-Sadok, M.: "Ibn Khurradādhbih". In: *EI2*, vol. 3 (1986), pp. 839a–840a.
[17] Herrera-Casais – Schmidl 2008, pp. 279–280.
[18] Besides "scheme," sometimes also "diagram" and "chart" appear, e. g., "Kaʿba-centered geographical scheme" in King, David A. – Richard P. Lorch: "Qibla Charts, Qibla Maps, and Related Instruments". In: *The History of Cartography* 2/1. *Cartography in the Traditional Islamic and South Asian Societies*. Eds. J. B. Harley – David Woodward. Chicago/London: University of Chicago Press, 1992, pp. 189–205, here p. 190b, parallel in King 1991, p. 183a; "scheme" in Herrera-Casais – Schmidl 2008, p. 278; "diagrams giving information about the rising and setting and appearance of the moon, and *qibla*, and the rainbow" in King, David A.: *Mathematical Astronomy in Medieval Yemen. A Biobibliographical Survey*. Malibu: Undena Publications, 1983, p. 33, "diagrams" in King 1991, p. 185b, "*qibla* diagram" in King 2020, §29; "qibla charts" and "charts of different design" in King – Lorch, *Qibla charts*, p. 189b and p. 192b, respectively.
[19] Arabic text, English translation, and study in Herrera-Casais – Schmidl 2008, pp. 277–284.
[20] Schmidl, *Volkstümliche Astronomie*, pp. 15–18; also King, *Mathematical Astronomy in Medieval Yemen*, pp. 20–21.
[21] For Ibn Surāqa's eleven-sector scheme King 1991, pp. 183b–184b; for his twelve-sector scheme ibid, p. 183b.

human body.[22] For example for the Yemen, after listing several localities belonging to this region and the associated segment of the perimeter of the Kaʿba he writes:

ومن كان في إحدى هذه البلاد وجعل القطب بين عينيه وسهيل إذا طلع على أذنه اليمنى وإذا غرب خلف إذنه اليسرى ومشرق الشتاء على إذنه اليمنى أيضاً والصبا على كتفه الأيمن والشمال بلقاء وجهه والجنوب على كتفه الأيمن فقد استقبل جهة الكعبة

> "Who is in one of these localities and puts the (northern) pole (*al-quṭb*) between his two eyes, Canopus (*suhayl*; α Car), if it rises, at his right ear, and if it sets behind its left ear, and sunrise at the winter (solstice; *mashriq al-shitāʾ*) is also at the right ear, and (who puts the wind) *ṣabā* at his right shoulder, the *shamāl* in front of him and *janūb* at the right shoulder, he then faces the direction towards the Kaʿba."[23]

At the same time as Ibn Surāqa, Shams al-Dīn al-Muqaddasī (also called al-Maqdisī; fl. second h. of 10th c.), presents in his geographical treatise *Aḥsan al-taqāsīm fī maʿrifat al-aqālīm* ("The best divisions for the knowledge of the regions") an eight-sector scheme as a text-image-arrangement. It is, however, difficult to tell if it is *de facto* the earliest graphical *qibla* scheme known since al-Muqaddasī's authorship is to be questioned.[24] For it is only preserved in one manuscript belonging to the second or Berlin version of his treatise, according to the library where its manuscript is preserved, datable ca. 1500 (cf. fig. 1).[25] It depicts a ruler-straight rectangle that touches with its four vertices a circle surrounded by another circle, both as if drawn with a compass. Together they form a ring that is subdivided into eight sectors of equal size. From the centre to the periphery, the depiction presents the Kaʿba, inscribed with *bayt Allāh al-ḥarām* ("The Holy House of God"), with specific parts of the building, its corners and its surroundings also labelled. Of the sectors, only seven provide the relevant information for the determination of the *qibla*, and not in all cases completely. Although the text is corrupted, it includes in most cases sets of localities, the associated segment of the perimeter of the Kaʿba, and a description of the direction.[26] The textual information partially contradicts the graphical realisation that appears to follow other rules, such as the equidistant subdivision of the ring, aesthetical, and decorative reasons.[27]

---

[22] Arabic text, German translation, and study in Schmidl, *Volkstümliche Astronomie*, pp. 271–275 and pp. 584–599; also King 1991, p. 184.
[23] Schmidl, *Volkstümliche Astronomie*, pp. 272–273 [English translation by the author]
[24] Cf. Herrera-Casais – Schmidl 2008, p. 285: "[...], the attribution of the scheme to al-Muqaddasī should be taken with caution." and King, *World-Maps*, p. 52, fig. 3.2.1: "One of the oldest known schemes of Islamic sacred geography, found in a late 15th-century copy of the geographical treatise of the 10th-century scholar al-Maqdisī but certainly not original to that work."
[25] Herrera-Casais – Schmidl 2008, p. 285 and p. 287.
[26] Arabic text, English translation, and study in Herrera-Casais – Schmidl 2008, pp. 285–297.
[27] Cf. the figure in Herrera-Casais – Schmidl 2008, p. 291, fig. 2 and the photo in King, *World-Maps*, p. 52, fig. 2.3.1.



Fig. 1: The *qibla* scheme in the Berlin copy of Shams al-Dīn al-Muqaddasī's *Aḥsan al-taqāsīm fī maʿrifat al-aqālīm* (Staatsbibliothek Preußischer Kulturbesitz, Ahlwardt 6034 (Sprenger 5), p. 34; photo: © Staatsbibliothek zu Berlin – Preußischer Kulturbesitz, Orientabteilung).

2. Coexistence

According to this evidence, *qibla* schemes provided in running texts appear earlier than those presented as text-image arrangements. The textual schemes, however, do not disappear after the 11th century, but continue in use side by side, albeit apparently less commonly.[28] This is clearly demonstrated by a cluster of *qibla* schemes found in copies of three Yemeni treatises from the 13th and early 14th century (cf. Table 1).

scheme	source	manuscript
F1	*Tuḥfat al-rāghib* by al-Fārisī	Milano, Biblioteca Ambrosiana, X 73 sup. (Griffini 37; copied Ramaḍān 965/June–July 1558, hence: M), fol. 29b–33a [cf. Fig. 2–3]
F2	*Tuḥfat al-rāghib* by al-Fārisī (?)	M, fol. 36b [cf. Fig. 5]
F3	*Tuḥfat al-rāghib* by al-Fārisī (?)	M, fol. 37a [cf.Fig. 4]
A1	*Kitāb al-Tabṣira* by al-Ashraf ʿUmar	Oxford, Bodleian Library, Huntington 233 (Uri 05), (most probably copied 14th century; hence: H), fol. 116b [cf. Fig. 6]
	Kitāb al-Tabṣira by al-Ashraf ʿUmar	Paris, Bibliothèque nationale de France, Arabe 2601 (copied Muḥarram 1036/September–October 1626; hence: P), fol. 153b [cf. Fig. 7]
A2	*Kitāb al-Tabṣira* by al-Ashraf ʿUmar (?)	P, 151b–152b
A3	Kitāb al-Tabṣira by al-Ashraf ʿUmar (?)	P, 153a [cf. Fig 9]
E1	anonymous ephemeris	Cairo, Dār al-kutub, Mīqāt 817,2 (copying date unknown), fol. 84b [cf. Fig. 10]

Table 1: *Qibla* schemes from 13th and 14th century Rasūlid Yemen.

2.1 The *qibla* schemes in al-Fārisī's *Tuḥfa*

Author, text, manuscripts

The earliest of these schemes is found in the *Tuḥfat al-rāghib wa-turfat al-ṭālib fī tasyīr al-nayyirayn wa-ḥarakāt al-kawākib* ("The book of the curiosity of the demanding and the rarity of the requesting on the revolutions of the both luminaries and the motions of the planets") written in the second half of the 13th century by Muḥammad b. Abī Bakr al-Fārisī (d. 1278–79 [?]), a scholar of wide learning and author of about nine works on medicine, music, magic, and astronomy.[29] He was

[28] Cf. King 2020, sub "Index". The dominance of graphic schemes might be, however, due to research methods, since they are easier to discover in manuscripts than those in running texts. For further examples of textual schemes King 2020, sub "Index", §10 (Ibn al-Ajdābī [Lybia, 13th c.],), §12 (Shihāb al-Dīn al-Qarāfī [Egypt, 13th c.]), §19 (ʿIzz al-Dīn b. Jamāʿa [Cairo, 14th c.], §25 (al-Qalqashandī [Egypt, 15th c.]).

[29] Schmidl, Petra G.: "Fārisī". In: *The Biographical Encyclopedia of Astronomers*. Eds. Thomas Hockey et al. New York: Springer, 2007. 2nd ed. 2014, pp. 357b–359a; Schmidl, *Volkstümliche*

closely related to the court of the second Rasūlid sultan, al-Muẓaffar Yūsuf (d. 1295), father of al-Ashraf ʿUmar (d. 1296) and author of the second treatise taken into consideration in this article and to be discussed below.[30] al-Fārisī's *Tuḥfa*, a treatise of folk astronomical contents, deals with calendar conversions, timekeeping, first sighting of the lunar crescent, determination of prayer times, finding the *qibla* and related topics presenting its knowledge in running texts, schemes, diagrams, and depictions.[31] The whole treatise is preserved in a manuscript of a possible Yemeni origin finished in 965/1558 and now in Milano, while the fragment of al-Fārisī's *Tuḥfa* now in Berlin does not include the *qibla* schemes.[32]

The qibla schemes

The first of these *qibla* schemes (F1) is presented in twelve paragraphs of running text, each starting with *al-jiha* ("the direction") followed by the respective number emphasized by a bolder and larger script than its remaining text (cf. fig. 2–3). It forms the eleventh chapter of al-Fārisī's *Tuḥfa*. Its *qibla* information provides sets of localities, orientations by astronomical horizon phenomena and winds, as well as associations with a segment of the perimeter of the Kaʿba.[33] It is closely related to Ibn Surāqa's eight-sector scheme included in Ibn Rahīq's folk astronomical treatise from the 11th century.[34]

The second *qibla* scheme in al-Fārisī's *Tuḥfa* (F2) provides a text-image-arrangement that fills one page of ca. 25 × 15 cm (cf. fig. 5).[35] It depicts a rectangle in its centre that presents the Kaʿba with some of its parts labelled and surrounded by a circle. Arranged around it there are twelve parabolic sectors that include the information for finding the *qibla* and that are again surrounded by a circle. The graphic elements are drawn without the support of a ruler or compass, so that the whole arrangement appears somewhat sloppy. Each text in the parabolic sectors starts with "*miḥrāb*" ("prayer-niche") and a respective number, the first introducing the Yemen and the southern corner of the Kaʿba, probably due to the author's

Astronomie, pp. 18–27; also King, *Mathematical Astronomy in Medieval Yemen* pp. 23–26; partial Arabic text, German translation, and study of the *Tuḥfa* in Schmidl, *Volkstümliche Astronomie*, pp. 307–359 and pp. 615–699.

[30] Cf. 2.3.

[31] A table of contents in Schmidl, *Volkstümliche Astronomie*, p. 27.

[32] Schmidl, *Volkstümliche Astronomie*, pp. 24–26.

[33] Arabic text, German translation, and study in Schmidl, *Volkstümliche Astronomie*, pp. 342–349 and pp. 637–699, here esp. pp. 645–646.

[34] Cf. King 1991, p. 183b: "Ibn Surāḳa's 12-sector scheme was also used by the 7th/13th century Yemeni astronomer al-Fārisī in his treatise on folk astronomy."

[35] According to Löfgren, Oscar – Traini, Renato: *Catalogue of the Arabic Manuscripts in the Biblioteca Ambrosiana*, vol. 2: nuovo fondo, series A–D (nos. 1–830). Vicenza: Pozza, 1981, p. 142, no. cclxx, who add in parentheses: "4 smaller ff. (folios – pgs)."



Fig. 2–3: Two pages of the first *qibla* scheme in al-Fārisī's *Tuḥfat al rāghib wa-turfat al-ṭālib fī tasyīr al-nayyirayn wa-ḥarakāt al-kawākib* (F1 [cf. Table 1]) including the complete paragraphs for the fourth to the seventh direction (Biblioteca Ambrosiana, X 73 sup. [Griffini 37], fol. 30a–b; photo: © Veneranda Biblioteca Ambrosiana, Milano).

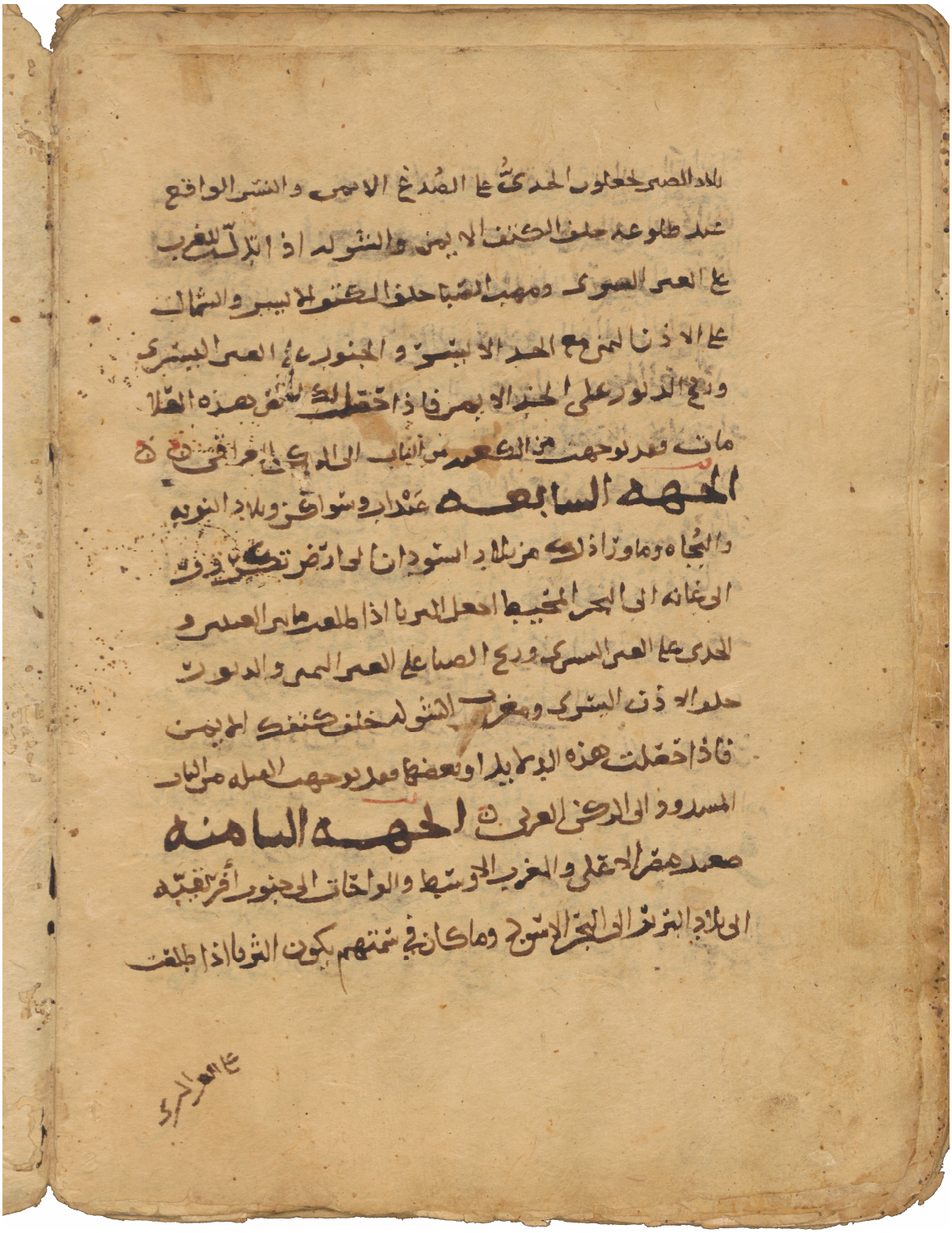



Fig. 4: The third *qibla* scheme in al-Fārisī's *Tuḥfat al rāghib wa-turfat al-ṭālib fī tasyīr al-nayyirayn wa-ḥarakāt al-kawākib* (F3 [cf. Table 1]; Biblioteca Ambrosiana, X 73 sup. [Griffini 37], fol. 37a; photo: © Veneranda Biblioteca Ambrosiana, Milano).



Fig. 5: The second *qibla* scheme in al-Fārisī's *Tuḥfat al rāghib wa-turfat al-ṭālib fī tasyīr al-nayyirayn wa-ḥarakāt al-kawākib* (F2 [cf. Table 1]; Biblioteca Ambrosiana, X 73 sup. [Griffini 37], fol. 36b; photo: © Veneranda Biblioteca Ambrosiana, Milano).

stay in this region.[36] A link to the cardinal south direction of pre-modern Arabic maps might be admittedly also conceivable, though doubtful in view of the different types of maps produced and their varying orientations.[37] Additionally to the consecutive numbering of the sectors, the sets of localities and the associations with a segment of the perimeter of the Kaʿba, al-Fārisī includes orientations by astronomical horizon phenomena, though not by the winds.

The third scheme in al-Fārisī's *Tuḥfa* (F3) also arranges its text graphically (cf. fig. 4). The arrangement fills one page opposite the second scheme (F2) and resembles a twelve-petalled flower. In its centre, the Kaʿaba is depicted and inscribed in detail. It is surrounded by additional buildings that are also labelled. Outside the petals containing the *qibla* information, further astronomical and architectural details are added. The scheme is related to the cardinal directions and the places of sunrise and sunset at the solstices. Further it details the gates and the columns of the Sacred Mosque, again in relation to the depiction of the Kaʿba.[38] Similar to the second scheme in al-Fārisī's *Tuḥfa* (F2), the features are drawn without the support of a ruler or a compass. Concerning the *qibla* information, it shares many commonalities with the first scheme in al-Fārisī's *Tuḥfa* (F1), although it omits the orientations of the winds and does not number the sectors, so that there is no clear indication where to start reading the scheme, and how to proceed. The most striking difference, however, remains the presentation of this knowledge, in the first scheme (F1) in a running text, in the third (F3) as a text-image arrangement.

While the first scheme (F1) clearly belongs to the *Tuḥfa* forming the eleventh chapter of a total of twelve, it is at least doubtful for the other two (F2, F3). They might have been either an integral part of this treatise or added later, as they are located at the end of the *Tuḥfa*, after the colophon and before the start of another text, an explanation though, less plausible for the second scheme (F2; cf. below).[39]

[36] Arabic text, German translation, and study in Schmidl, *Volkstümliche Astronomie*, pp. 350–355 and pp. 663–676.
[37] For examples, Tibbetts, Gerald R.: "The Balkhī School of Geographers". In: *The History of Cartography 2/1. Cartography in the Traditional Islamic and South Asian Societies*. Eds. J. B. Harley – David Woodward. Chicago, London: University of Chicago Press, 1992, pp. 108–129; for further reading Brentjes, Sonja: "Cartography". In: *Encyclopaedia of Islam*, THREE.
[38] Arabic text, German translation, and study in Schmidl, *Volkstümliche Astronomie*, pp. 342–359 and pp. 637–699.
[39] Cf. the argumentation in Schmidl, *Volkstümliche Astronomie*, p. 676 concerning the three *qibla* schemes in al-Fārisī's *Tuḥfa*; also Löfgren & Traini, *Catalogue*, p. 142, no. cclxx.

2.2 The *qibla* schemes in al-Ashraf ʿUmar's *Tabṣira*

Author, text, manuscripts

The next group of *qibla* schemes is preserved in the *Kitāb al-Tabṣira fī ʿilm al-nujūm* ("Enlightenment in the science of the stars") written in 13th century Yemen by al-Ashraf ʿUmar, the third of the Rasūlid sultans. al-Khazrājī (d. 1410) who to the end of the 14th century wrote a history of the Rasūlid dynasty describes him as "an auspicious prince, wise, excellent, learned, ingenious, of good manners, and quiet" who "occupied himself with an acquisition of the sciences" and "compiled many works."[40]

The *Tabṣira* comprises 50 chapters on a great variety of topics, astronomical, astrological, mathematical, and geographical knowledge as well as calculating, prognostic, and magic practices. This information is presented in running texts, lists, numerical and non-numerical one- and double-argument tables, schemes, diagrams, and charts. Maps, illustrations, and miniatures are missing.[41] In some

[40] ʿAsal, Muḥammad – James William Redhouse (eds.): *The Pearl-strings: A History of the Resúliyy Dynasty of Yemen by 'Aliyyu'bnu'l-Ḥasan El-Khazrejiyy with Translation, Introduction, Annotations, Index Tables, and Maps*, vol. 1. Leiden: Brill, London: Luzac & Co., 1906, p. 236.
For more details about the author and his oeuvre Schmidl, Petra G.: "Ashraf". In: *The Biographical Encyclopedia of Astronomers*. Eds. Thomas Hockey et al. New York: Springer, 2007. 2nd ed. 2014, pp. 66a–67b; Schmidl, Petra G.: "Rulers as Authors in 13th Century Yemen: al-Ashraf ʿUmar's Oeuvre". To appear in the proceedings of the conference *Rulers as Authors: Knowledge, Authority and Legitimacy* held at Hamburg, Centre for the Study of Manuscript Cultures (CSMC) in December 2017 and organized by Sonja Brentjes, Maribel Fierro, and Tilman Seidensticker; Varisco, Daniel Martin: *Medieval Agriculture and Islamic Science. The Almanac of a Yemeni Sultan*. Seattle, London: University of Washington Press, 1994, pp. 12–16; for al-Ashraf ʿUmar's *instrument text* and the astrolabes he made King, David A.: *In Synchrony with the Heavens. Studies in Astronomical Timekeeping and Instrumentation in Medieval Islamic civilization*. Vol. 2: *Instruments of mass calculation (Studies X–XVIII)* (Islamic philosophy, theology and science 55). Leiden: Brill, 2005, study XIVa and Schmidl, Petra G.: "Two early Arabic sources on the magnetic compass (revised translation of a master thesis, Johann Wolfgang Goethe-Universität Frankfurt 1994)". *Journal of Arabic and Islamic Studies* 1 (1997), pp. 81–132; for his treatises on genealogy Mahoney, Daniel: "Writing the Ethnic Origins of the Rasulids in Late Medieval South Arabia". *The Medieval History Journal* 21 (2018), pp. 380–399.
[41] About the *Tabṣira* in general Schmidl, Petra G.: "Des Sultans Sternkunde. Al-Ashraf ʿUmar (st. 1296) und sein *Kitab al-Tabṣira fi 'Ilm al-Nujum*". *Jemen-Report* 47:1–2 (2016), pp. 36–40 and Schmidl, Petra G.: "al-Ashraf ʿUmar's *Tabṣira*: The Table of Contents. Supporting Sovereign Decision-making in 13th Century Yemen?" In: *Unterstützung bei herrscherlichen Entscheiden. Experten und ihr Wissen in transkultureller und komparativer Perspektive*. Ed. Michael Grünbart (Kulturen des Entscheidens 5). Göttingen: Vandenhoeck & Ruprecht, 2020, pp. 216–232; about specific chapters and contents of the *Tabṣira* Schmidl, Petra G.: "The planets and their corresponding colours in astrology – an example from 13th century Yemen". In: *Colours in Culture and Science*. Ed. Gudrun Wolfschmidt (Nuncius Hamburgensis – Beiträge zur Geschichte der Naturwissenschaften 22). Hamburg: Tredition, 2011, pp. 548–573; Schmidl 2012; Schmidl, Petra G.: "al-Ashraf ʿUmar's *Tabṣira*: Chapter xxvii.1. Numbers in the Service of Religion in an Example from 13th Century Yemen". In: *Zahlen- und Buchstabensysteme im Dienste religiöser Bildung*. Eds. Reinhard Gregor Kratz – Laura V. Schimmelpfennig (Studies in education and religion in ancient and pre-modern history in the Mediterranean and its environs 5). Tübingen: Mohr Siebeck, 2019, pp. 75–111; Varisco, Daniel M.: "The Magical Significance of the Lunar Stations in the 13th Century Yemeni *Kitāb al-Tabṣira fī ʿilm al-nujūm* of al-Malik al-Ashraf". *Quaderni di Studi Arabi* 13 (1995), pp. 19–40.

cases tables are labelled *jadwal* as well as schemes and diagrams being labelled *ṣūra* or *zā'irja*. Other times, they are introduced as if a running text will follow, namely by *qawl*, *dhikr* or *maʿrifa*.

The *Tabṣira* is preserved in two manuscripts, one now in Oxford (henceforth abbreviated: H) most probably copied in 14th century Yemen by a neat hand using black and red ink for contrast. After the preface it provides a table of contents followed by fifty numbered chapters that are all included.[42] The other copy, today in Paris (henceforth abbreviated: P), was recently brought to the author's attention by Bink Hallum, London.[43] Copied in 1626 by a delicate hand using *muʿallaq* letterforms, e. g., the *sīn* without its denticles, it differs widely from the Oxford manuscript. Whole chapters are transposed or omitted including the table of contents, new material is added.[44] All in all, the Oxford manuscript appears more reliable and closer to al-Ashraf 'Umar's version of the text.

The qibla *schemes*

Only one *qibla* scheme both copies of the *Tabṣira* share (A1; H,116b and P,153b). In the Oxford manuscript it forms the first part of chapter xxxvii and fills one page (cf. fig. 6).[45] Opposite, another circular diagram presents an association of lunar mansions, zodiacal signs, seasons, and cardinal directions. The *qibla* scheme resembles a twelve-petaled flower, each petal of the same size and including the *qibla* information in black and red ink alternatingly. In the circle in the centre thin red strokes, roughly a square and four horizontal, one vertical line, indicate the Kaʿba. The sketch of the edifice is surrounded by a ring subdivided into twelve sectors, each bearing the word *miḥrāb* ("prayer-niche"), again alternatingly written in red and black ink. Above and below the scheme, framed in red, are the title and a short description of the scheme's contents and use.

In the Paris manuscripts, the *qibla* scheme (A1) consists of a circle subdivided into twelve equidistant sectors instead of a twelve-petaled flower, so that the overall composition remains the same (cf. fig. 7). The text-image arrangement is not

[42] For more details Schmidl 2012, pp. 46–48; for Arabic text and English translation of the table of contents https://tabsira.hypotheses.org/ (last viewed 24. 11. 2020) – sub "Table of contents" and, supplemented by a study, Schmidl 2020 (as in n. 41).
[43] Vajda, Georges: *Index général des manuscrits arabes musulmans de la Bibliothèque Nationale de Paris*. Paris: Editions du Centre National de la Recherche Scientifique, 1953. p. 647; also Beeston, A. F. L.: *Revisions of Rescriptions of Various Medical & Scientific Arabic MSS in the Bodleian Library*. Unpublished manuscript kept in the Oriental Collections workroom, Weston Library, sub "MS Hunt. 233" (copy kindly provided by Bink Hallum, London).
[44] A concordance of the two manuscripts is in preparation by the author and will be published on https://tabsira.hypotheses.org/.
[45] The size is not given in Uri, Ioannes: *Bibliothecae Bodleianae codicum manuscriptorum orientalium [...] catalogus, pars prima*. Oxonii: Typographeum Clarendonianum, 1787, p. 196–197, no. cmv, but assessable by the manuscript's belonging to the group of "Mathemathici et geographi. In folio" (p. 187).



Fig. 6: The first *qibla* scheme in the Oxford copy of al-Ashraf ʿUmar's *Kitāb al-Tabṣira fī ʿilm al-nujūm* (A1 [cf. Table 1]; Oxford, Bodleian Library, Huntington 233 [Uri 05], fol. 116b; photo: courtesy of the Bodleian Library, Oxford).

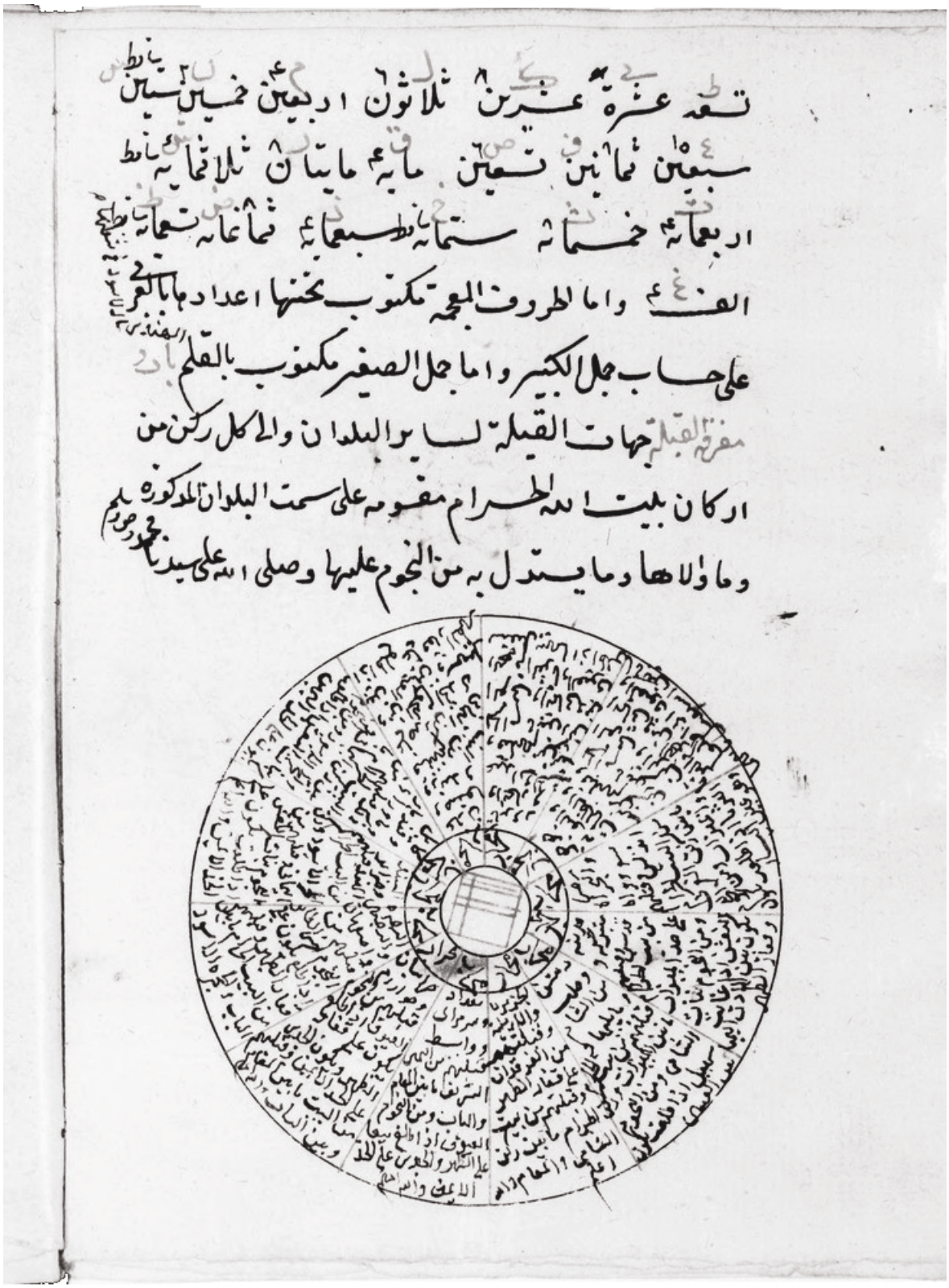

Fig 7: The first *qibla* scheme in the Paris copy of al-Ashraf ʿUmar's *Kitāb al-Tabṣira fī ʿilm al-nujūm* (A1 [cf.Table 1]; Bibliothèque nationale de France, Arabe 2601, fol. 153b; photo: courtesy of the Bibliothèque nationale de France, Paris).

framed, and fills roughly only half of the page.[46] It lacks the contrast of red and black ink that leading to a less elaborated and decorative impression than the Oxford manuscript conveys. The sketch of the Kaʿba in the centre, however, is very similar in both copies.

As reflected in the first scheme in al-Ashraf ʿUmar's *Tabṣira* (A1), it appears that copyists of astronomical and astrological treatises handle text-image-arrangements differently to plain text. They appear to be subject to greater changes, due to personal abilities, regional features, and taste of time, as it also holds true for script and layout. On the other hand, the copyists' attitude towards the text *itself* seems to reflect high fidelity.[47]

While the graphical realization differs, the text provided in the sectors of the *qibla* scheme (A1) and its structure are nearly identical in both manuscripts. After the term *miḥrāb* ("prayer-niche"), that one might conceive as a heading, follows a set of localities. Introduced by the wording "The *qibla* of those (living there)," next the direction is defined, first by associating it with a segment of the perimeter of the Kaʿba and second by describing it by means of astronomical horizon phenomena (cf. Table 2 and in the appendix). The sectors are unnumbered, so that there is again no clear starting point.

sector	perimeter of the Kaʿba	sets of localities	orientation by astronomical horizon phenomena
1	southern corner	ʿAdan, Ṣanʿāʾ, Zabīd	Pole Star (*al-judayy*; α UMi) between both eyes; rising of Canopus (*suhayl*; α Car) on the spine
2	between southern corner and Black Stone	Kābul, al-Qandahār and what is beyond	rising of the three stars in the handle of the Plough (*banāt naʿsh*; ηεζ UMa) above the right cheek
3	as in sector 2	India (*al-Sind*), the islands of India (*Jazāʾir al-Hind*)	as in sector 2
4	between door and Black Stone	al-Baṣra, China (*al-Ṣīn*), Iṣfahān	rising of Atair (*al-nasr al-ṭāʾir*; α Aql) on the spine
5	between prayer place of Abraham and door	Khurāsān, Khwārizm	rising of Capella (*al-ʿayyūq*; α Aur) on the spine; Pole Star (*al-judayy*; α UMi) on the right cheek
6	as in sector 5	Baghdād, Samarra (*Sarra man Raʾā* [?]), Wāsiṭ	as in sector 5
7	between northern corner and prayer place of Abraham	al-Jazīra, Armīniya	*al-farqadān* (βγ UMi) on the spine
8	between rainwater spout and northern corner	Damascus (Dimashq), Aleppo (*Ḥalab min al-Shām*) and what lies next to them	rising of Canopus (*suhayl*; α Car) between both eyes

[46] https://gallica.bnf.fr/ark:/12148/btv1b100375751/f189.item.r=Arabe%202601?lang=FR – (last viewed 24. 02. 2020): "Format: [...] Hauteur, 21 centimètres; largeur, 14 centimètres et demi."

[47] An example provides the manuscripts of al-Ṣūfī's *Kitāb ṣuwar al-kawākib* (cf. n. 4).

sector	perimeter of the Kaʿba	sets of localities	orientation by astronomical horizon phenomena
9	towards rainwater spout	Medina (*Madīnat al-Nabī*, lit. "the city of the prophet"), Jerusalem (*al-Quds*)	setting of the three stars in the handle of the Plough (*banāt naʿsh*; ηεζ UMa) between the right ear and the spine
10	between western corner and rainwater spout	Cairo (or: Egypt [?]; Miṣr), *al-baḥr al-aswad*, al-Andalus	rising of the Pleiades (*al-thurayyā*; M 45 with η Tau) on the left eye
11	between western and southern corner	Barbarā (?), al-Nūba, and al-Ẓulamāt (Atlantic)	rising of the Pleiades (*al-thurayyā*; M 45 with η Tau) and of Capella (*al-ʿayyūq*; α Aur) turn your face between both of them
12	as in sector 11	the land of al-Bujāt ʿAydhāb, Ethiopia (*al-Ḥabasha*), (Takrūr [*Timbuktu*])	as in sector 11

Table 2: Summary of the data provided in the first *qibla* scheme in al-Ashraf ʿUmar's *Tabṣira* (A1) (for the difficulties in translating the place names and for more information Schmidl, *Volkstümliche Astronomie*, pp. 431–465)

When analysing the text provided in the first *qibla* scheme in al-Ashraf ʿUmar's *Tabṣira* (A1), two points are striking. First the discrepancy between the information it includes and that imparted by the graphical elements. While the latter arranges the sectors evenly around the Kaʿba, the specifications given in the former express differently (cf. Figure 1).

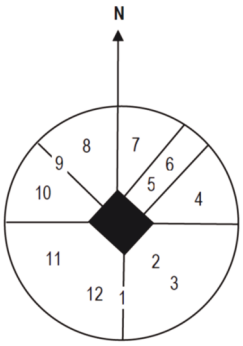

Fig. 8: Sectors and their association with the perimeter of the Kaʿba as provided in the texts of the first *qibla* scheme in al-Ashraf ʿUmar's *Tabṣira* (A1).

Second, three times two sectors are associated with the same segment of the perimeter of the Kaʿba (sectors 2 and 3, sectors 5 and 6, sectors 11 and 12). The same holds for the astronomical phenomena describing the direction. Only the localities mentioned differ. To explain this finding a copying error appears less convincing than assuming an expansion of an originally eight- or nine- to a twelve-sector scheme. This step, however, was most probably not undertaken by al-Ashraf ʿUmar himself, mainly due to two reasons. First, the overall picture of the context and the contents of the *Tabṣira* sees its author compiling his treatise from earlier sources rather than presenting his own work. In the preface, al-Ashraf ʿUmar states:

اقتـ[ـبسنا] هذا المجموع ليكون تبصرة . يستغني بها طالبها عن كثير من كتب الحساب وينال بها على استعجاله حاجته وقت الطلاب

> "(We sought to acquire) this collection (of materials) so that it becomes an enlightenment. By (using this collection), its student can dispense with lots of books on reckoning (*kutub al-ḥisāb*). Through it is expeditiously obtainable what he needs during (his) studies (?)."[48]

Second, given al-Fārisī's connection to the Rasūlid court and al-Ashraf ʿUmar's familiarity with his oeuvre — this scholar is mentioned as his source in chapter xiv —[49] the most plausible scenario sees the second scheme in al-Fārisī's *Tuḥfa* (F2) as the source of the first scheme in al-Ashraf ʿUmar's *Tabṣira* (A1), because the *qibla* details are nearly identical. This holds true for the associated segments of the perimeter of the Kaʿba, the sets of localities, and the astronomical phenomena describing the *qibla* directions, although they are more complete in the *Tuḥfa*. The only exception where the *Tabṣira* provides more information than the *Tuḥfa* concerns the mentioning of Takrūr in sector 12 in the Paris manuscript. One major difference between both schemes concerns the order of sectors 5 and 6, that are interchanged in the first scheme of al-Ashraf ʿUmar's *Tabṣira* (A1), but also that the scheme in the *Tuḥfa* numbers its sectors while the one in the *Tabṣira* does not.[50]

Again, and similarly to the two depictions of the first scheme in al-Ashraf ʿUmar's *Tabṣira* in the Oxford and the Paris manuscripts (A1), the graphical realisation of the second scheme in al-Fārisī's *Tuḥfa* (F2) shows more differences. The most obvious concerns that the latter is drawn without the support of a ruler or a compass and therefore looks sloppier than the former. What is shown in the Oxford copy of al-Ashraf ʿUmar's *Tabṣira* (A1) as a neatly arranged twelve-petaled flower and in the Paris manuscript (A1) as a compass-drawn circle with twelve sectors, in al-Fārisī's *Tuḥfa* consists of twelve irregular parabolic sectors inscribed in a circle drawn freehand (F2).

If the second scheme in the *Tuḥfa* (F2) is either the source of the first scheme in the *Tabṣira* (A1) or they have a common ancestor, as seems probable, it follows more feasibly that the former was originally part of al-Fārisī's treatise. If so, their close relationship makes it more plausible that the extension of an eight- or nine- to a twelve-sector scheme happened before its inclusion in the *Tabṣira*. Other possibilities, however, are also conceivable, since both treatises are no autographs and the manuscript of the *Tuḥfa* is later than the Oxford copy of the *Tabṣira*.

---

[48] Schmidl, Petra G.: "al-Ashraf ʿUmar's *Tabṣira*: The Preface. Announcing an introductory text?". *Zeitschrift für Geschichte der arabisch-islamischen Wissenschaften* 22 (2020), pp. 163-196, here p. 194-195.
[49] Schmidl 2012, pp. 45–46.
[50] Schmidl, *Volkstümliche Astronomie*, pp. 664–665.

Besides the *qibla* scheme that the two manuscripts of the *Tabṣira* share, the Paris copy additionally includes two eight-sector schemes, one in a running text (A2; P,151a–152b), the other as a text-image arrangement (A3; P,153a). The former lists unnumbered paragraphs with sometimes incomplete sets of localities, orientation by cardinal directions and astronomical horizon phenomena as well as winds. The associated segments of the perimeter of the Kaʿba are not further specified.

The third scheme in al-Ashraf ʿUmar's *Tabṣira* (A3; P,153a), a text-image arrangement, fills roughly three fourths of the page (cf. fig. 9).[51] It consists of a circle subdivided into eight sectors of different size with three smaller concentric circles of increasing diameter forming its centre. The borderlines between the sectors are drawn twice, first with straight lines most probably supported by a ruler and then freehand to adjust them to the amount of text. Accordingly, copying the *qibla* scheme involved at least two steps, first drawing the outline of the scheme and second filling in the text.[52] Therefore, the person drawing the outline seems not to be aware of the amount and organisation of the text that will be filled in. This might rather point to two different people involved in the process of copying — or a very unmindful and careless copyist. It appears even likely that it originally comprises only seven sectors, an eighth squeezed in additionally. The innermost circle in the centre of the scheme surrounds the word "Kaʿba," between it and the middle circle an eight-pointed star is enclosed. Between its points the four cardinals are included and the four ordinal directions specified by astronomical horizon phenomena such as *mashriq (al-) ṣayf* ("place of summer [solstice] sunrise").[53] They serve as headings for each of the eight sectors containing the *qibla* information. Again, the sectors are not numbered, so that there is no clear starting point and reading direction. The dependencies of these two eight-sector schemes (A2 & A3), their possible sources, and their belonging to the *Tabṣira* as well as their relationship to the twelve sector-scheme in al-Ashraf ʿUmar's *Tabṣira* (A1) still deserve further investigations.

In addition to these three schemes, a rectangular *qibla* diagram is presented at the end of the *Tabṣira* in the Paris manuscript (P,180b). It stands in the tradition of al-Dimyāṭī (fl. 12th c. [?]), a legal scholar from Egypt.[54] In the upper third in the

[51] Cf. also n. 44.
[52] The manuscript of the *Dustūr al-munajjimīn* (Paris, Bibliothèque Nationale de France, Arabe 5968) copied in Iran between the 12th and 14th century documents a similar procedure for tables according to Orthmann, Eva; Schmidl, Petra G.: "The Provenance and History of the *Dustūr al-munajjimīn* and its Manuscript". In: *Science in the City of Fortune. The Dustūr al-munajjimīn and its World*. Eds. Eva Orthmann – Petra G. Schmidl (Bonner Islamstudien 39). Berlin: EBV, 2017, pp. 13–33, here p. 26 and pp. 28–31.
[53] The omission of the article, although describing the other ordinal directions, might point less to a lack of space than to a non-Arabic, most probably Persian, native speaker.
[54] King, David A.: "Architecture and Astronomy. The Ventilators of Medieval Cairo and Their Secrets". *Journal of the American Oriental Society* 104:1 (1984), pp. 97–133, here p. 115 with n.

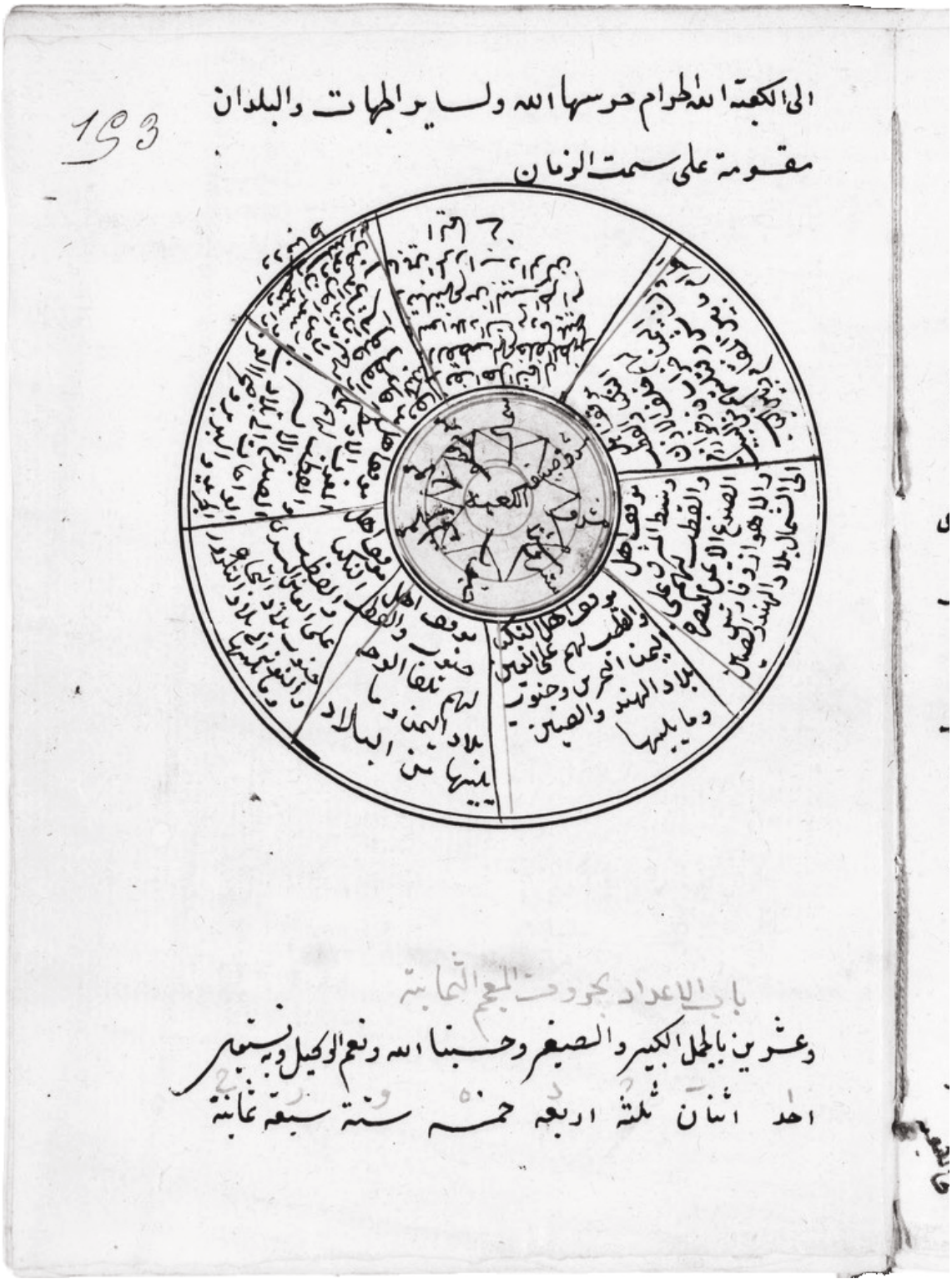

Fig 9: The third *qibla* scheme in the Paris copy of al-Ashraf ʿUmar's *Kitāb al-Tabṣira fī ʿilm al-nujūm* (A3 [cf. Table 1]; Bibliothèque nationale de France, Arabe 2601, fol. 153a; photo: courtesy of the Bibliothèque nationale de France, Paris)

70–71 and p. 125–126, pl. 13 and 14; also King – Lorch 1992, p. 192a–192b with fig. 9.3; King, *World-Maps*, pp. 49–51 with fig. 2.2.2 and fig. 2.2.3.

middle an inscription mentions Mecca, to its right a cloud-like shape adumbrates the Red Sea. From the point marking the city straight lines radiate that denote different *qibla* directions and are inscribed alongside with the names of the according localities. Their inclination reproduces approximately the directions described in the schemes by astronomical horizon phenomena and the winds. The diagram is incompletely framed in red ink, the lower part cut off. Outside the frame at the centre of each side cardinal directions and/or localities are inscribed in red ink. In the four corners the according regions appear.

In comparison to the *qibla* schemes, in this and similar diagrams the role of the text is reduced. For the orientation neither ensues by astronomical horizon phenomena, nor the winds or cardinal directions, but by the angle that the lines determine. The diagram's sources as well as its belonging to the *Tabṣira* deserve further research.[55]

2.3 The *Qibla* scheme in an anonymous ephemeris

Related to these schemes in al-Fārisī's *Tuḥfa* and al-Ashraf ʿUmar's *Tabṣira*, is another *qibla* scheme included in the final part of an anonymous ephemeris for Ṣanʿāʾ compiled ca. 727/1326–27 and mentioning al-Muʾayyad Dāʾūd (d. 1322), al-Ashraf ʿUmar's brother and successor, on the first page (cf. fig. 10).[56] It shares many commonalities concerning its *qibla* information with the second scheme in al-Fārisī's *Tuḥfa* (F2) and the first scheme in al-Ashraf ʿUmar's *Tabṣira* (A1). But it is less complete than the second scheme in al-Fārisī's *Tuḥfa* (F2) and does not number its sectors. In this regard, it is closer to the first scheme in al-Ashraf ʿUmar's *Tabṣira* (A1) whose order it most probably follows by keeping its interchangement of sector 5 and 6. The organization of the text in the sectors, however, apparently pursue the second scheme in al-Fārisī's *Tuḥfa*, since in the ephemeris first the orientation by the stars is mentioned, while al-Ashraf ʿUmar begins with the association of the segment of the perimeter of the Kaʿba. A common source for these three schemes might well explains their dependencies.

Overall, this cluster of Yemeni *qibla* schemes gives clear evidence that textual and graphical *qibla* schemes coexisted at the same time and place. One should, however, keep an eye on the fact that none of these schemes is preserved in an autograph. Therefore, still a small degree of uncertainty remains, if in the copying process graphical and textual forms were maintained.

[55] Cf. the argumentation in Schmidl, *Volkstümliche Astronomie*, p. 676 concerning the three *qibla* schemes in al-Fārisī's *Tuḥfa*.

[56] King, *Mathematical Astronomy in Medieval Yemen*, p. 33; for this article was only accessible the preliminary edition and translation in King, David A.: *The Sacred Geography of Islam. Unpublished Script* (copy kindly provided by the author); the *qibla* scheme is neither mentioned in King, David A.: *A Catalogue of the Scientific Manuscripts in the Egyptian National Library* (in Arabic). Cairo: General Egyptian Book Organization, 1986, vol. 2, p. 148, no. 2/3/2 nor King, *Survey*, p. 132, no. E11.



Fig. 10: The qibla scheme in the anonymous ephemeris (E1 [see Table 1]; Dār al-kutub, Mīqāt 817, 2, fol. 84b; photo: courtesy of Dār al-kutub wa-l-wathā'iq al-qawmiyya, Cairo).

3 Some Preliminary Observations

Possible reasons that might explain the coexistence of textual and graphical *qibla* schemes can be found on different levels. How the knowledge is presented might depend on the author or the copyist, e. g., his personal preferences, his interests or his skills, but also on the target audience, on the overall contents of the treatise where the scheme is included, and much else. From a practical point of view, producing or copying a running text needs, at least, other skills, devices and resources than a (colourful) text-image arrangement, e. g., the space they require differs.[57] The same holds true for reading or using them, e. g., while running texts has a clear beginning and end, some schemes do not indicate where to start reading and where to continue.

Despite these basic differences, modern research refers to the information as *qibla* schemes regardless of whether provided in running texts or included in text-image arrangements. It does not distinguish between these two different kinds of how knowledge is presented,[58] most probably due to the commonalities of the textual elements. They include, generally speaking, a set of localities, an association with a segment of the perimeter of the Kaʿba, and a direction described either by astronomical horizon phenomena, the winds or cardinal directions, whereas the number of sectors might vary. Therefore, each sector provides an initial problem, namely the people of specific localities looking for the direction towards the Kaʿba in Mecca. And it describes its solution, the *qibla* direction provided. Sometimes included is a statement that one might understand as a prognostication, if you follow this instruction, then you will be opposite a segment of the perimeter of the Kaʿba in Mecca.[59] From a formal point of view, the paragraphs might be understood as procedural texts whose structure runs parallel to the if-then-constructions often found in prognostic texts describing, for example, astrological, meteorological or medical practices.[60]

[57] Cf. King 2020, §29 dealing with the *qibla* scheme in the cosmography entitled *Kharīdat al-ʿajāʾib wa-farīdat al-gharāʾib* by Pseudo-Ibn al-Wardī (Syria, 15th c.): "Several copies have a blank space where the *qibla* diagram might have been. Either the copyists did not like drawing diagrams, or they could not choose which one to copy!"
[58] Cf. n. 18.
[59] An example provides the first *qibla* scheme in al-Fārsī's *Tuḥfa*, for Arabic text, German translation, and study cf. n. 33.
[60] The term "procedure text" is commonly applied to a group of Mesopotamian sources, e. g., Ritter, James: "Babylon–1800". In: *Elemente einer Geschichte der Wissenschaften* (suhrkamp taschenbuch wissenschaft 1355). Ed. Michel Serres. Frankfurt am Main: Suhrkamp, 2nd ed. 2002, pp. 38–71, here p. 61 or Ossendrijver, Mathieu: *Babylonian Mathematical Astronomy. Procedure Texts*. New York: Springer, 2012, p. 16. For an example, e. g., Fodor, Alexander: "Malhamat Daniyal". In: *The Muslim East. Studies in Honour of Julius Germanus*. Ed. Gyula Káldy-Nagy. Budapest: Lorand Eötvös University, 1974, pp. 84–133 + 26 pages in Arabic or Varisco 1995.



Fig. 11: The *qibla* diagram at the end of the Paris copy of al-Ashraf ʿUmar's *Kitāb al-Tabṣira fī ʿilm al-nujūm* (Bibliothèque nationale de France, Arabe 2601, fol. 181a; photo: courtesy of the Bibliothèque nationale de France, Paris)

To arrange the text in a circle around the Kaʿba does not add further essential information. On the contrary, this arrangement is independent or even contradicts the text that is understandable and applicable without it, as in the first scheme in al-Ashraf ʿUmar's *Tabṣira* (A1; cf. fig. 6). The graphical element is a surplus that arranges, organizes, and visualizes the information. The knowledge presented in a scheme might become simpler to access, more attractive, more

suitable for didactical purpose and even more entertaining than that presented in running texts. For as text-image arrangements, *qibla* schemes might look more puzzling than running texts, partly because they often do not have a clear starting point or an indicated reading direction. Treated in company, they even gain a ludic element. Overall, one might understand *qibla* schemes as procedural texts that might be arranged graphically, but not necessarily.

Intricately linked to the commonalities of the textual and the role of the graphical element as a surplus is the permeability between how knowledge is presented, in a running text or as text-image arrangements. Both can be easily transformed from one into the other and *vice versa* as unintentionally demonstrated in the edition and translation of al-Ashraf ʿUmar's *qibla* scheme (see in the appendix).[61] This permeability and transformability, however, does not convey how knowledge is presented as arbitrarily exchangeable. While kept in *qibla* schemes provided in form of lists,[62] the exchangeability is lost in a tradition of *qibla* schemes observable since the 12th century. They group localities equidistantly around the Kaʿba without mentioning the association of the sectors with a segment of its perimeter and without describing the directions by means of cardinal directions, astronomical horizon phenomena or the winds. Seemingly, at least the first task should be undertaken by the graphical element.[63] The same holds true for *qibla* diagrams as the one preserved at the end of the Paris manuscript.

Permeability, transformability, and exchangeability in how knowledge is presented deserves further research, since even in two different copies of the same treatise they might be interchanged. The part dealing with the appropriate times for bloodletting in al-Ashraf ʿUmar's *Tabṣira* is presented once in a non-numerical table, the other in a running text.[64]

---

[61] For another example of permeability of knowledge presentations in a completely different context, namely Old Babylonian rational practices (mathematics, medicine, divination, jurisdiction) Ritter, Jim: "Reading Strassbourg 369: a Thrice-Told Tale". In: *History of Science, History of Text*. Ed. Karine Chemla. Berlin/Göttingen/Heidelberg: Springer, 2004, pp. 177–200, here p. 194: "The line between such tables and the procedural texts is not always clear cut; there exists rather a spectrum from the purely tabular verbless tables, through tables involving abbreviated procedures, to the full procedure texts with their structured verbal chains. This point can be seen in the divination texts with their rather simple verbal chains. Are they abbreviated procedure texts or elaborated tables?"

[62] King 2020, §35; King 1991, pl. viii; also King – Lorch 1992, p. 197, fig. 9.10.

[63] Cf. King – Lorch 1992, p. 193: "[...] the well-known geographer Yāqut (575–626/1179–1229) also reproduced a twelve-sector scheme, without the instructions for finding the qibla, in his *Kitāb Muʿjam al-buldān* (Dictionary of countries) (fig. 9.7). Are we to assume that in this case the diagram its annotations would speak for itself?"; also King, *World-Maps*, pp. 53–55 with fig. 2.3.4.

[64] H,120b–121a and P,132a–132b, respectively; Arabic text, English translation, and study in Schmidl, Petra G.: "Magic and Medicine in a 13th c. treatise on the Science of the Stars. The *Kitāb al-Tabṣira fī ʿilm al-nujūm* of the Rasulid sultan al-Ashraf ʿUmar". In: *Herbal Medicine in Yemen: Traditional Knowledge and Practice, and their Value for Today's World* (Islamic History and Civilization 96). Eds. Ingrid Hehmeyer – Hanne Schönig: Leiden: Brill, 2012, pp. 43–68, here pp. 58–60.

4 Appendix: The *qibla* Scheme in al-Ashraf ʿUmar's *Tabṣira* (A1)

[To render the alternatingly writing in black and red ink, regular and bold letters are used in the edition and the translation. The text in P,153b shows only minor differences with exception of sector 12 where Takrūr (Timbuktu) is additionally mentioned in P.]

4.1 Text

<H,116a> [1] **الباب السابع والثلـ[ـثـ]ـون في معرفة جهات القبلة** على سوية[65] والله أعلم[65] <H,116b> إلى كلّ ركن من أركان البيت حرسه الله تعالى ومعرفة قسمة المنازل بين[66] البروج وما لكلّ فصل منها في الشمال والجنوب[66] .

> [A *qibla* scheme resembling a twelve-petaled flower follows. Edition and translation provide the text of each petal in a separate paragraph starting at eleven o'clock and proceeding counterclockwise.[67]]

[2] **معرفة جهات القبلة لسائر البلدان إلى كلّ ركن من أركان البيت حرسه الله[68] تعالى مقسومة على سمت البلدان المذكورة وما ولاها وما يستدلّ من النجوم عليها**[68] .

[sector 1] **محراب** عدن وصنعاء وزبيد قبلتهم من البيت الحرام حرسه الله تعال على حدّ الركن اليماني ومن النجوم الجدّي بين العينين وسهيل إذا طلع على فقار الظهر .

[sector 2] محراب **كابل والقندهار وما وراء ذلك وقبلتهم من البيت الحرام ما بين الركن اليماني والحجر الأسود ومن النجوم بنات نعش إذا طلعت على الخدّ اليمين .**

[sector 3] **محراب** السند وجزائر الهند وقبلتهم من البيت الحرام حرسه الله تعالى ما بين الحجر الأسود والركن اليماني وقبلتهم من النجوم بنات نعش إذا طلعت تكون على الخدّ الأيمن .

[sector 4] محراب **البصرة والصين واصـ[ـفـ]ـهان وقبلتهم من النجوم النسر الطائر إذا طلع يكون على فقار الظهر وقبلتهم من البيت الحرام حرس الله تعالى ما بين الباب والحجر الأسود .**

[sector 5] **محراب** خرسان وخوارزم وقبلتهم من النجوم العيّوق إذا طلع يكون على فقار الظهر ويكون الجدّي على الخدّ الأيمن وقبلتهم من البيت حرس الله ما بين المقام وبين الباب .

[sector 6] محراب **بغداد سرّ مـ[ـن] رأى وواسط وقبلتهم من البيت الشريف ما بين المقام والباب ومن النجوم العيّوق إذا طلع على فقار الظهر والجدّي على الخدّ الأيمن والله أعلم .**

[sector 7] **محراب** الجزيرة وأرمينية وقبلتهم من [النجوم] والفرقدان على فقار الظهر وقبلتهم من البيت الحرام حرسه الله وشرّفه ما بين الركن الشامي والمقام والله أعلم .

[sector 8] محراب **دمشق وحلب من الشام وما يليها وقبلتهم من البيت الحرام ما بين الميزاب والركن الشامي ومن النجوم سهيل إذا طلع يكون بين العينين والله أعلم .**

[sector 9] **محراب** مدينة النبي صلّى الله عليه وسلّم والقدس وقبلتهم من البيت الحرام حرسه الله تعالى على حدّ الميزاب ومن النجوم بنات نعش إذا غابت تكون بين الأذن اليمنا[69] وفقار الظهر .

[sector 10] محراب **مصر والبحر الأسود والأندلس وقبلتهم من البيت الحرام ما بين الركن الغربي والميزاب ومن النجوم الثريّا إدا طلعت تكون على العين اليسار .**

---

[65] H writes *supra lineam*.
[66] The title continues on H,117a.
[67] The second scheme in al-Fārīsī's *Tuḥfa* (F2) that is closely related to al-Ashraf ʿUmar's numbers the prayer niches, the first one being for the Yemen.
[68] The text continues below the scheme.
[69] H writes frequently ـا… – *alif* instead of ـى… – *alif maqṣūra*.

[sector 11] **محراب** بربر[ا][70] والنوبة والظلمات وقبلتهم من البيت الحرام حرسه الله تعالى ما بين الركن الغربي والركن اليماني ومن النجوم الثريّا والعيّوق إذا طلعا فاستقبل ما بينهما .

[sector 12] محراب **بلد البجاة وعيذاب والحبشة وقبلتهم من البيت الحرام ما بين الركن الغربي واليماني ومن النجوم الثريّا والعيّوق استقبل بينهما إذا طلعا** .

4.2 Translation[71]

<H,116a> [1] **The thirty-seventh chapter on the knowledge of the *qibla* directions** (*jihāt al-qibla*) — together (?) and God knows best — towards each corner of the corners of the (Holy) House — may God the Exalted protect it —, the knowledge of the division of the lunar mansion in between the zodiacal signs and what belongs to each of the seasons towards north and south.

[The following text is arranged in a circular *qibla* scheme.[72]]

[2] **The determination of the *qibla* directions (*jihāt al-qibla*) for all cities (and territories) to each corner of the corners of the House — may God the Exalted protect it — arranged according to the direction of the cities (and territories; *samt al-buldān*) mentioned and what lies next to it and what indicates (the direction) respective the stars.**

[sector 1] **Prayer Niche**. ʿAdan, Ṣanʿā' and Zabīd. The *qibla* of those (living there) is respective the (Holy) House — may God the Exalted protect it — the edge of the Yemeni corner. (The *qibla* of those living there is) respective the stars the Pole Star (*al-judayy*; α UMi) between both eyes and Canopus (*suhayl*; α Car), when it rises, on the spine.

[sector 2] Prayer Niche. **Kābul, al-Qandahār and what is beyond them. The *qibla* of those (living there) is respective the (Holy) House between the Yemeni corner and the Black Stone. (The qibla of those living there is) respective the stars the three stars in the handle of the Plough (*banāt naʿsh*; ηεζ UMa), when they rise, above the right cheek.**

[sector 3] **Prayer Niche**. India (*al-Sind*) and the islands of India (*jazā'ir al-Hind*). The *qibla* of those (living there) is respective the (Holy) House — may God the Exalted protect it — between the Black Stone and the Yemeni corner. The *qibla* of those (living there) is respective the stars the three stars in the handle of the Plough (*banāt naʿsh*; ηεζ UMa), when they rise, they are above the right cheek.

[sector 4] Prayer Niche. **al-Baṣra, China (*al-Ṣīn*) and Iṣfahān. The *qibla* of those (living there) is respective the stars Atair (*al-nasr al-ṭā'ir*; α Aql), when it rises, it is on the** spine. **The *qibla* of those (living there) is respective the Holy House — may God the Exalted protect it — what is between the door and the Black Stone.**

---

[70] H writes حوحو .

[71] For the difficulties in translating the place names and more information cf. Schmidl, *Volkstümliche Astronomie*, pp. 431–465.

[72] For more information cf. the description in section 2.2 above "The *qibla* schemes in al-Ashraf ʿUmar's *Tabṣira*" and cf. Fig. 6.

[sector 5] **Prayer Niche**. Khurāsān and Khwārizm. The *qibla* of those (living there) is respective the stars Capella (*al-ʿayyūq*; α Aur), when it rises, it is on the spine, and the Pole Star (*al-judayy*; α UMi) is on the right cheek. The *qibla* of those (living there) is respective the (Holy) House — may God the Exalted protect it — between the (prayer) place (of Abraham) and the door.

[sector 6] Prayer Niche. **Baghād, Samarra (*Sarra m[an] raʾā* [?]) and Wāsiṭ. The *qibla* of those (living there) is respective the Noble House between the (prayer) place (of Abraham) and the door. (The *qibla* of those living there is) respective the stars Capella (*al-ʿayyūq*; α Aur), when it rises, on the spine and the Pole Star (*al-judayy*; α UMi) on the right cheek — and God knows best.**

[sector 7] **Prayer Niche**. al-Jazīra, and Armīniya. The *qibla* of those (living there) is respective (the stars) *al-farqadān* (βγ UMi) on the spine. The *qibla* of those (living there is) respective the Holy House — may God the Exalted protect it and exalt it — between the Syrian corner and the (prayer) place (of Abraham) — and God knows best.

[sector 8] Prayer Niche. **Damascus (*Dimashq*), Aleppo (*Ḥalab min al-Shām*) and what lies next to them. The *qibla* of those (living there) is respective the Holy House between the** rain**water spout and the Syrian corner. (The *qibla* of those living there is) respective the stars Canopus (*suhayl*; α Car), if it rises, it is between both eyes — and God knows best.**

[sector 9] **Prayer Niche**. Medina (*Madīnat al-Nabī*; lit. "the city of the prophet") — may God bless him and grant him salvation —, and Jerusalem (*al-Quds*). The *qibla* of those (living there) is respective the Holy House — may God the Exalted protect it — towards the edge of the rainwater spout. (The *qibla* of those living there is) respective the stars the three stars in the handle of the Plough (*banāt naʿsh*; ηεζ UMa), when they set, they are between the right ear and the spine.

[sector 10] Prayer Niche. **Cairo (or: Egypt [?]; *Miṣr*), *baḥr al-aswad*,[73] and al-Andalus. The *qibla* of those (living there) is respective the Holy House between the western corner and the** rain**water spout. (The *qibla* of those living there is) respective the stars the Pleiades (*al-thurayyā*; M 45 with η Tau), when they rise, they are on the left eye.**

[sector 11] **Prayer Niche**. Barbarā (?), Nubia (*al-Nūba*), and the Atlantic (*al-Ẓulamāt*). The *qibla* of those (living there) is respective the Holy House — may God the Exalted protect it — between the western corner and the Yemeni corner. (The *qibla* of those living there is) respective the stars the Pleiades (*al-thurayyā*; M 45 with η Tau) and Capella (*al-ʿayyūq*; α Aur), when they both rise, (then) turn your face between both of them.

[sector 12] Prayer Niche. **The land of al-Bujāt, ʿAydhāb, and Ethiopia (*al-Ḥabasha*). The *qibla* of those (living there) is respective the (Holy) House between the western and the**

[73] Taking into consideration the general direction of sector 10, *al-baḥr al-aswad* denotes in this context rather "the sea of the blacks" than "the Black Sea."

Yemeni corner. (The *qibla* of those living there is) respective the stars the Pleiades (*al-thurayyā*; M 45 with η Tau) and Capella (*al-ʿayyūq*; α Aur), turn your face between both of them, when they rise.

4.3 Commentary

al-Ashraf ʿUmar's scheme (A1) is closely related to the second scheme in al-Fārisī's *Tuḥfa* (F2), so that its detailed analysis remains valid in this case, too.[74] In general and approximately, the sets of localities mentioned, the associated segment of the perimeter of the Kaʿba and the description of the orientation by means of the stars match together (cf. Table 3). Only sector 2 is problematic, the localities mentioned, Kabūl and al-Qandahār, are located northeast, not southeast to Mecca and the Kaʿba.

sector	perimeter of the Kaʿba	sets of localities	orientation by the stars
1	S	ʿAdan, Ṣanaʿāʾ, Zabīd	NNW–N
2	SE (!)	Kābul, al-Qandahār and what is beyond	NW–NNW (!)
3	SE	India (*al-Sind*), the islands of India (*jazāʾir al-Hind*)	NW–NNW
4	E	al-Baṣra, China (*al-Ṣīn*), Iṣfahān	W
5	NE	Khurāsān, Khwārizm	SW–WSW
6	NE	Baghdād, Samarra (*Sarra man Raʾā* [?]) and Wāsiṭ	SW–WSW
7	NNE	al-Jazīra, Armīniya	SSW–S–SSE
8	NNW	Damascus (*Dimashq*), Aleppo (*Ḥalab min al-Shām*) and what lies next	SE–SSE
9	NW	Medina (*Madīnat al-Nabī*, lit. "the city of the prophet"), Jerusalem (*al-Quds*)	SES–SE–SSE
10	WNW	Cairo (or: Egypt [?]; *Miṣr*), *al-baḥr al-aswad*, al-Andalus	E–ESE
11	SW	Barbar(ā) (?), *al-Nūba*, and al-Ẓulamāt (Atlantic)	NE–ENE
12	SW	al-Bajāt, ʿAydhāb, *al-Ḥabasha*, (Takrūr [Timbuktu])	NE–ENE

Table 3: Analysis of the sectors described in the first scheme in al-Ashraf ʿUmar's *Tabṣira* (A1)

Sources of Illustrations

Fig. 1: Preußischer Kulturbesitz, Orientabteilung — Fig. 2–5: Veneranda Milano, Biblioteca Ambrosiana — Fig. 6: Oxford, Bodleian Library — Fig. 7, 9, 11: Bibliothèque nationale de France — Fig. 10: Dār al-kutub wa-l-wathāʾiq al-qawmiyya, Cairo

[74] Schmidl, *Volkstümliche Astronomie*, pp. 663–676.