Minbar, Shawl or Teeth?
Triangular Tables in Arabic Manuscripts

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Tables (*ǧadāwil*, sg *ǧadwal*) are fairly common in Arabic technical and scientific manuscripts. Triangular tables are a particular case that results from the reduction of orthogonal arrays under particular circumstances. This contribution focuses on two case studies—a table of comparative chronology and one for the combination of logical propositions—and illustrates some peculiar features of triangular tables and their use, offering also their edition and translation.

The presence of tables (*ǧadāwil*, sg *ǧadwal*) in Arabic scientific and technical manuscripts is not exceptional.[1] Tables represent a formidable tool to arrange materials and contents in a synthetic graphical form, conveying complex relations at a first glance. A table is not just a geometrical layout to display information, but a way to organize it in a relational way.

Simple one-dimensional tables have a single set of elements in the header row that labels the contents of the columns underneath it. In such tables, the contents of the cells in a row are related to the same object (for instance, a table that lists name and age of a number of people). Two-dimensional tables express a more articulated level of relation. These arrays have two sets of elements, one in the header row and the other in the header column, and the resulting combined values are uniquely related to a single cell.

In Arabic manuscript tradition, two-dimensional (lookup) arrays usually take the form of an orthogonal table, with only the size of the page and the content of the cells to limit the number of rows and columns. In order to help the eye of the reader to follow a particular row or column, the text within the cells can be written along the diagonal, with the possibility to create zigzag patterns. The same purpose is behind the use of different coloured inks. Chromatic variety and direction of the writing are often used in combination in order to create highly refined decorative effects on the page, in a magistral combination of aesthetic and functional aspects.

1   The entry 'Djadwal' in the second edition of the *Encyclopaedia of Islam* deals solely with magical squares, see Graefe et al. 1965.

All these features—the shape, the structure, the layout and even the decoration of a table—are meant to convey the relation between the two sets of elements in the headers,[2] and each particular kind of interaction between the sets of elements has its most suitable and ergonomic way to be displayed.

Triangular tables represent a peculiar way of expressing the interaction between form and content. These are a particular case of the two-dimensional table that takes the shape of a right-angled triangle, with the cells along the hypotenuse creating the characteristic zig-zag line. These tables can be oriented in different directions, and the position of the right angle—either in the upper or in the lower part—may convey different overall impressions and produce an association with different objects meant to recall this shape. The two case studies that follow illustrate the different possibilities to arrange contents provided by this particular kind of array. The triangular tables presented here have been collected in the course of research dedicated to other topics. The characteristic shape caught my attention and it is, in fact, the most striking feature that these different tables have really in common. Their content, logic arrangement, and design show considerable differences depending, on the one side, upon the information they convey and, on the other, upon the overall material dimension and quality of the manuscript.

1. Comparative chronology

The first example of such triangular table is a display of comparative chronology. It is included in MS Aix-en-Provence, Bibliothèque Méjanes, 1347 (1212) f. 7v (see fig. 1). The manuscript contains an incomplete copy of the *Ḫulāṣat al-siyar fī bayān ibtidāʾ al-ʿālam wa-baʿḍ aḥwāl ḫayr al-bašar* ('Epitome of the Lives of the Prophets: the Beginning of the World and Some Circumstances in the Life of the Best of Mankind'), a universal history and a biography of the Prophet Muḥammad, composed by Muḥammad Bīk al-Hindī later called al-Makkī for taking up residence in Mecca (tenth century AH/sixteenth century CE).[3] An ownership note sets the *terminus ante quem* for the copy in the year AH 1109/1697–1698 CE.

In the course of a discussion of the different opinions about the years that elapsed between the lives of different prophets (Adam, Alexander, Noah) present in various sources and traditions (Christians, Muslims, a number of

2   On the use of tables and tree diagrams in Galenic summaries, with an analysis of
      the relation between form and content, see Raggetti 2020, 152–175.
3   See Ministère de la culture et de la communication 1902, 82 (short description
      by by M. Gaudefroy-Demombynes; see also <https://ccfr.bnf.fr/portailccfr/
      ark:/06871/004D40040431>) and *Bibliothèque Méjanes,* no. 24. Another copy of
      the text is mentioned in Kafait Ullah Hamdani 2018, 27–29. This study suggests
      Muḥammad Bīk b. Yār Muḥammad al-Naqšabandī as the name of the author.

Fig. 1. Ms Aix-en-Provence, Bibliothèque Méjanes, 1347 (1212), f. 7v: page with the table for comparative chronologies, defined as *ğadwal al-minbariyya*.

celebrated historians such as Ibn al-ʿAsākir), the copyist includes a triangular table, labelled as *ğadwal al-minbariyya* ('*minbar*-shaped table') by a rubricated caption in the margin that runs parallel to the rule-borders. Its shape is thus compared to that of the iconography of the pulpit in the mosque—a

closed staircase leading up to a seat or a kiosk-like structure, observed from its side—the origin of which goes back to the raised seat which the Prophet Muḥammad occupied in the assemblies of the first Muslim community. The table was probably drawn and filled by the same expert hand that copied the main text, and the inks seem to be consistent with the rest of the text around the table.

When a triangular table, as in this case, has its right angle in the lower part, the zig-zag of the diagonal may indeed remind of the stairs of a *minbar*. This resemblance might have very well been inspired by other representations of this architectural element in the Arabic manuscript tradition. Among the illustrations that accompany many of the manuscripts of the popular devotional text of the *Dalāʾil al-ḥayrāt*, in fact, there is a double image that depicts the burial place of Muḥammad (*al-Rawḍa al-Mubāraka*, 'the Blessed Garden') including also the *minbar* of the Prophet in the Mosque of Medina (fig. 2).[4]
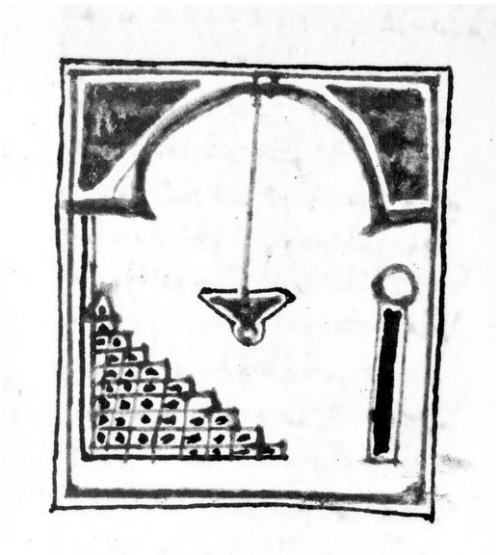
Fig. 2. Ms Paris, BnF, Arabe 6246, *Dalāʾil al-ḥayrāt,* f. 14r, representation of the *minbar* of the Prophet in the Mosque of Medina, © <www.gallica.bnf.fr>.

The table of comparative chronologies has a single set of elements distributed in the cells along the zig-zag hypotenuse. These elements are represented by the event that marked the beginning of different eras and their respective chronologies. The table offers a comparative overview of the chronological gap between two chronologies, expressed as a number of years. The function of this table goes beyond the simple definition of the chronological divide between the 'years zero' in two different calendars. In fact, this number

4   See Witkam 2007b, 298–299.

of years is a constant value that, through simple additions and subtractions, helps to determine the equivalence of any year in the different calendars. In the context of a discussion on comparative chronologies, such table may indeed represent a practical tool to have at hand next to the text.

The elements in the 'header diagonal' are eight events that marked the beginning of different historical eras. These are arranged in chronological order in the cells along the hypotenuse, from the top to the bottom: the flood (*al-ṭūfān*), the reign of Nebuchadnezzar (*Buḫt naṣṣar*, i.e. 605 BCE),[5] Philip of Macedonia (*Fīlifus*, in the manuscript *Fīlis*, i.e. 359 BCE),[6] Alexander the Great (*Ḏū-l-Qarnayn*, i.e. 336 BCE), Octavianus Augustus (*Aġusṭus*, in the manuscript *A'šṭuš*, i.e. 27 BCE),[7] Diocletian (*Duqliṭiyānūs*, in the manuscript *Duqiyānūs*, i.e. 284 CE),[8] the *Hiǧra* of the Prophet Muḥammad (i.e. 622 CE), and the last Sasanid king Yazdaǧird (the third, i.e. 632 CE).[9]

Despite the apparently unique set of elements, this is a two-dimensional table. If one translates its values to a regular orthogonal array, the header row and the header column would both include the same set of eight elements—in this context, it is important to keep in mind that the eight elements in question are implicit numerical values expressed in words. The transposition of the value into an orthogonal array would produce a table in which the diagonal would see the matching of each era with itself, and would therefore contain only zeros; while the two halves of the table on either side of the diagonal would show the same set of values in mirror. The choice of a *minbar*-shaped table is, thus, an economical solution that avoids the duplication of values.

The numerical nature of the elements in the table allows to emend slips of the pen by conjecture (*ope ingenii)*, mistakes that would probably remain undetected—especially in the case of a single witness—if not embedded in a context that makes transparent the logical relations between them. For instance, the table associates the same value (1369) to two different combinations of eras, Nebuchadnezzar-Hiǧra and Nebuchadnezzar-Yazdaǧird. The *ǧadwal* clearly states that there are ten years and a few months between the date of the Hiǧra and the beginning of the reign of the last Sasanian king. Thus, relaying on the internal coherence of the table, the number of years elapsed between Nebuchadnedzar and Yazdaǧird can be corrected in 1379 (see the edition below).

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5   See Vajda 1960.
6   *Fīlis* in the manuscript.
7   *A'šṭuš* in the manuscript.
8   *Duqiyānūs* in the manuscript.
9   In the edition of the Arabic table, I have opted to preserve the names as they are attested in the manuscript.

Just above the triangular table, there is a clearly defined block of text—not even three lines—with indications for its correct use. These instructions describe the concrete and physical act to follow any column and row with one finger from either hand (the right for the oldest date, the left for the more recent one), until the two fingers meet in the cell of intersection (*bayt al-muštarak*). This confirms that this table is not an addition but an integral part of the text, at least in this manuscript witness.

The author of the *Ḫulāṣat al-siyar* provides a genealogy of his sources, that is a number of historians of the fourteenth and fifteenth century. The information summarized in this table, however, seems to stem from al-Bīrūnī's *Chronology of Ancient Nations* (*Al-āṯār al-bāqiya ʿan al-qurūn al-ḫāliya*), in particular from its third chapter ('On the Nature of the Eras and the Different Opinions of the Nations Regarding them').[10] In other words, this table provides information external to the main text recalling one of the most complete and authoritative opinions on the subject in support to the main text.

Al-Bīrūnī (d. AH 440/1048 CE), in fact, reports the different opinions of Christian and Jews about the relative distances between eras, trying to correct the calculations he considered imprecise. His list of eras, however, includes three more items that are not considered for this table: the era of creation (*Awwal al-awāʾil*), and the two reforms of the calendar operated by the Roman Emperor Antoninus Pius (r. 138–161) and by the Abbasid Caliph al-Muʿtaḍid bi-llah (r. 892–902).[11]

For each era, al-Bīrūnī stresses the peculiarity of the different systems for time calculations (lunar and solar calendars, presence of intercalary months, different dates for the beginning of the year, etc.). Although days and months are not included in the table, the approximation of +/-1 year in the calculations may mirror the necessary adjustments. In the case of the chronological interval between the last Sasanian emperor and the *Hiǧra* of the Prophet, the specification of the number of days seems to confirm that the dates could in some cases be down to the day, especially when closer in time.

10   For the Arabic text see al-Bīrūnī 1878, 13–35, for the English translation see al-Bīrūnī 1879, 16–32. Other data for the calculations might also have been derived from the sixth chapter of the *Chronology* ('On the derivation of the eras from each other, and on the chronological dates, relating to the commencements of the reigns of the kings, according to the various tradition'), in which more tables provide lists of rules from the different eras and dynasties, together with the precise duration of their reigns. Al-Bīrūnī's spellings of the ruler's names has served as basis for the emendation suggested for the spellings as attested in the manuscript.
11   For the calendar systems encountered in Arabic manuscripts, see Gacek 2009, 60–61.

The manuscript tradition of al Bīrūnī's *Chronology* itself is incredibly rich in tables, and at least another of al-Bīrūnī's works, the *Kitāb al-tafhīm li-awāʾil ṣināʿat al-tanğīm* ('The Book of Instruction in the elements of the art of astrology'), shares a similar propension for the use of tables, especially in the second part devoted to astrology.[12] The tables in question may be simple or two-dimensional, and normally have a rectangular shape. From the numerous admonishments that al Bīrūnī disseminated in his text, it clearly emerges how he dreaded the damages that a distracted, inept, or ignorant copyist could inflict to the contents. Referring to the tables he found in one his sources, al-Bīrūnī writes:[13]

> Now I have transferred those identical tables into this place of my book. Time has not enabled me to correct the names of the kings on the basis of their true pronunciation. I hope, therefore, that everyone will endeavour to correct and amend them, who like myself wishes to facilitate the subject for the student, and to free him from fatigue of research. And nobody ought to transcribe these tables and the other ones except him who is well acquainted with the *Ḥurûf-al-jummal* [arithmetical signs, numbers], and honestly endeavours to preserve them correct. For they are corrupted by the tradition of the copyist, when they pass from hand to hand among them. Their emendation is the work of many years.

Edward Sachau and other editors and translators of al-Bīrūnī have respectfully and scrupulously handled these tables, which are usually carefully reproduced not only in facsimile but also in printed editions. Perusing the seventh chapter of the *Chronology* in order to contextualize the Méjanes *minbar*, I saw that the *Chronology* manuscript tradition also includes a triangular table called here *ṭaylasān*, that is a head shawl that may be cut in a trapezoidal form.[14] The association with another object might have been driven by the different orientation of the triangle on the page, this time with its right angle on top, or just by a different personal or local kind of association. After having explained in his text how to determine whether a year is leap or nor, al-Bīrūnī adds that years can be defined as 'imperfect', 'intermediate' or 'perfect' on the account of the day of the week with which they begin. The subject is rather intricate and the branch diagram (*ʿalā ṭarīq al-taqsīm wa-l-tasğīr*) that resumes it in the previous page gives graphic form to the reasoning behind it by means of multiple divisions and crossed-ramifications (see fig. 3). The tree diagram reads as follows:[15]

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12 See al-Bīrūnī 1934, 1934.
13 See al-Bīrūnī 1879, 98.
14 See al-Bīrūnī 1878, 159 = 1879,152. The origins and lawfulness of this head shawls have been rather debated in Islamic jurisprudence, see Kindinger 2014, 64–80.
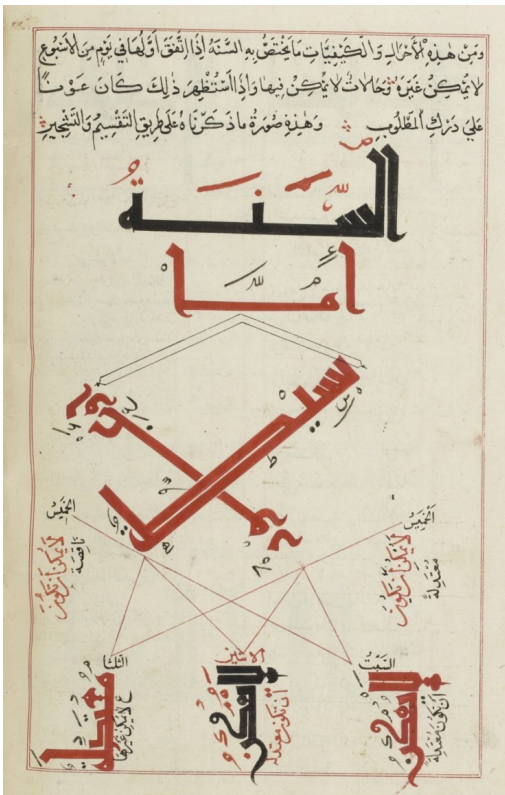15 al-Bīrūnī 1879,152.

Fig. 3. Branch-diagram from al-Bīrūnī's *Chronology* illustrating the complex relations between imperfect, intermediate, and perfect years, MS Paris, BnF, Arabe 1489, f. 59v, © <www.gallica.bnf.fr>.

The year is either		
a common year	or	a leap year
|		|
Thursday (i.e. if New Year's day is a Thursday)		*Thursday*
The year cannot be Imperfect		It cannot be Intermediate
	In both common and leap years	
Tuesday	*Monday*	*Saturday*
It is always Intermediate	It can never be Intermediate	It can never be Intermediate

The role of the *ṭaylasān* in what follows is to integrate the tree diagram and show in a synthetic way the results of further combinations of such conditions that allow or prevent years to follow each other, and is preceded by these indications:[16]

16   al-Bīrūnī 1879, 152–153.

Further, of these conditions there are certain ones which may happen in two consec-
utive years, whilst others cannot. If we comprise them in a *ṭaylasān*, it will afford
a help towards utilizing the circumstance, and will facilitate the method. We must
look into the square which belongs in common to the two qualities of the two years;
in that square it is indicated whether the two years of two such qualities can follow
each other or not.

Edward Sachau based his edition on three manuscripts available in Eu-
ropean libraries: one at the British Library (ms Add. 7491), the second in the
Bibliothèque Nationale in Paris (ms Arabe 1489), and the last in the private
collection of Sir Henry Rawlinson (later acquired by the British Library with
the class mark ms Or. 1495).[17] On f. 60r, the Paris manuscript shows how the
space of the page that remained blank due to the triangular form of the *ṭay-
lasān* is filled with a stylized vegetal decoration in blue, gold and white. The
elements in the headers are written in a thicker display script of a decorative
'neo-Kufic' style that alternates black and red,[18] while the cell at the intersec-
tion of the two headers defines the content of their cells: *al-kayfiyyāt* ('qual-
ities [of the years]', see fig. 4). This accurate and lavish decoration is in line
with the general style of this luxury manuscript, which extends to its technical
diagrams as well.

In this case, the *ṭaylasān* has a header column and a 'header diagonal'
with the same set of three elements (imperfect, intermediate, perfect). Dif-
ferently from the table in ms Aix-en-Provence, Bibliothèque Méjanes, 1347,
though the series of elements in the headers are identical, both need to be
displayed, since also the combinations between two identical elements are
relevant and productive. Moreover, here the relation between the different
elements is not a simple arithmetical calculation, but a complex combina-
tion of many factors previously illustrated by al-Bīrūnī. The *ṭaylasān*, in fact,
allows to reach the right conclusion about the kind of year in a mechanical
way, without the need to understand the complex conditions expressed in the
branch diagram.

17 An updated and definitely longer list of manuscript witnesses is given by J.P. Ho-
gendijk in the section of his website dedicated to al-Bīrūnī, <http://www.jphogendi-
jk.nl/biruni.html> (last accessed, 25 April 2021). A digital reproduction of the Paris
manuscript is available online <https://gallica.bnf.fr/ark:/12148/btv1b8406161z.
r=biruni%20athar?rk=21459;2> (last accessed 25 April 2021). Unfortunately, it
was impossible to see the other manuscript witnesses used by Sachau before the
publication of the present article.
18 For the display script, see Gacek 2009, 95; for the term 'neo-Kufic', see Witkam
2007a, 249.

MS Aix-en-Provence, Bibliothèque Méjanes, 1347 (1212), f. 7v—Edition

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مطلب جدول المنبرية

و هذا يعرف المنبرية يعلم منه ما بين التواريخ من السنين وطريق العمل به ان تضع اصبع اليد اليمنى على تأريخ الاقدم واصبع اليد اليسرى على تأريخ الاخر وتنزل باصبع اليد اليمنى حتى تحاذى بها اليسرى فتجد في بيت المشترك ما بيت التأريخين من السنين انتهى

							تأريخ طوفان
						تأريخ بحت نصر	سنة ٢٣٥٦
					تأريخ فيلس	سنة ٤٢٤	سنة ٢٧٨٠
				تأريخ ذي القرنين	سنة ١١	سنة ٤٣٥	سنة ٢٧٩٦
			تأريخ اعشطش	سنة ٢٨٢	سنة ٢٩٤	سنة ٧١٨	سنة ٣٠٧٤
		تأريخ دقيانوس	سنة ٣١٢	سنة ٥٩٤	سنة ٦٠٦	سنة ١٠٣١	سنة ٣٣٨٧
	تأريخ الهجرة	سنة ٣٣٧	سنة ٦٥٠	سنة ٩٢٣	سنة ٩٤٥	سنة ١٣٦٩	سنة ٣٧٢٥
تأريخ يزد جرد	سنة ١٠ و٧٩ يوما	سنة ٣٤٧	سنة ٦٦٠	سنة ٩٣٣	سنة ٩٥٥	سنة ١٣٦٩*	سنة ٣٧٣٥

جملة أيام ٣٦٢٣ مبتدأه الثلاثاء

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* This value can be corrected in ١٣٧٩ considering the ten years between the two calendars.

мs Aix-en-Provence, Bibliothèque Méjanes, 1347 (1212), f. 7v—Translation

Section: the minbar-shaped table (Maṭlab ğadwal al-minbariyya)

This is the table known as the *minbar*-shaped one, thanks to which one can know the years that separate the different eras. The way to use it is to place a finger from the right hand on the more ancient dating, while you place a finger of the left hand on the other dating, then you go down with the finger of the right hand until this is on the level with the left finger; then you will find the number of years between the two dating systems in the cell of intersection.

							Era of the flood
						Era of Nebuchad-nezzar	2356 years
					Era of Philip	424 years	2780 years
				Era of Alexander	11 years	435 years	2796 years
			Era of Augustus	282 years	294 years	718 years	3074 years
		Era of Diocletian	312 years	594 years	606 years	1031 years	3387 years
	Era of the Hiğra	337 years	650 years	923 years	945 years	1369 years	3725 years
Era of Yazdagird [III]	10 years and 79 days*	347 years	660 years	933 years	955 years	1369[1] years	3735 years

*For a total amount of 3624 days, with its beginning on a Tuesday

[1] This value can be corrected in 1379 considering the ten years between the two calendars.

Fig. 4. Shawl-shaped table (*ṭaylasān*) from al-Bīrūnī's *Chronology* that shows in a simple and direct way whether imperfect, intermediate, and perfect years can follow each other. MS Paris, BnF, Arabe 1489, f. 60r (detail), © <www.gallica.bnf.fr>.

2. Combining logical propositions

The second case study belongs to the commentary tradition on the *Tahḏīb al-manṭiq wa-l-kalām* ('Refinement of Logic and Speech'), a popular work by Masʿūd b. ʿUmar al- Taftāzānī (d. AH 792/1390 CE). This author's fame rests on his many commentaries and compendia in various fields of learning, that were widely adopted for teaching in the *madrasa* context.[19] I could collect two witnesses of this table. The first is an undated but relatively recent manuscript kept in the Bibliothèque Nationale in Paris (MS Paris, BnF, Arabe 5797, see fig. 5), which transmits the *Ǧalāl ʿalā tahḏīb al-manṭiq wa-l-kalām*, a commentary by Ǧalāl al-Dīn Muḥammad b. Asʿad al-Dawwānī's (d. AH 907/1501 CE).[20] The second is a multiple-text manuscript from a private collection (MS

19 See Brockelmann 1902, 215; Madelung 2000. See also Walbridge 2000, 61; and Brentjes 2018, 139, 165, 170, and 259. I would like to thank Sean Coughlin and Marco Bellini for discussing with me the contents of this table.

20 The reproduction the manuscript is available online, <https://gallica.bnf.fr/ ark:/12148/btv1b100320779.r=taftazani%20dawani?rk=21459;2> (last accessed 25 April 2021).

أخرى معتبرة في ضمن المركّبات ولم يعتبروها مفردة وقد وضعت

البسائط في شكل مهندس ووضعت النسبة بين كل اثنين منها فيلتقى

المخطّط الخارجين من كليهما تسهيلاً للضبط على المبتدي تمّت الحاشية

المنسوبة إلى أفضل المتأخّرين مولانا جلال

الدين محمد الدوّاني عليه الرحمة

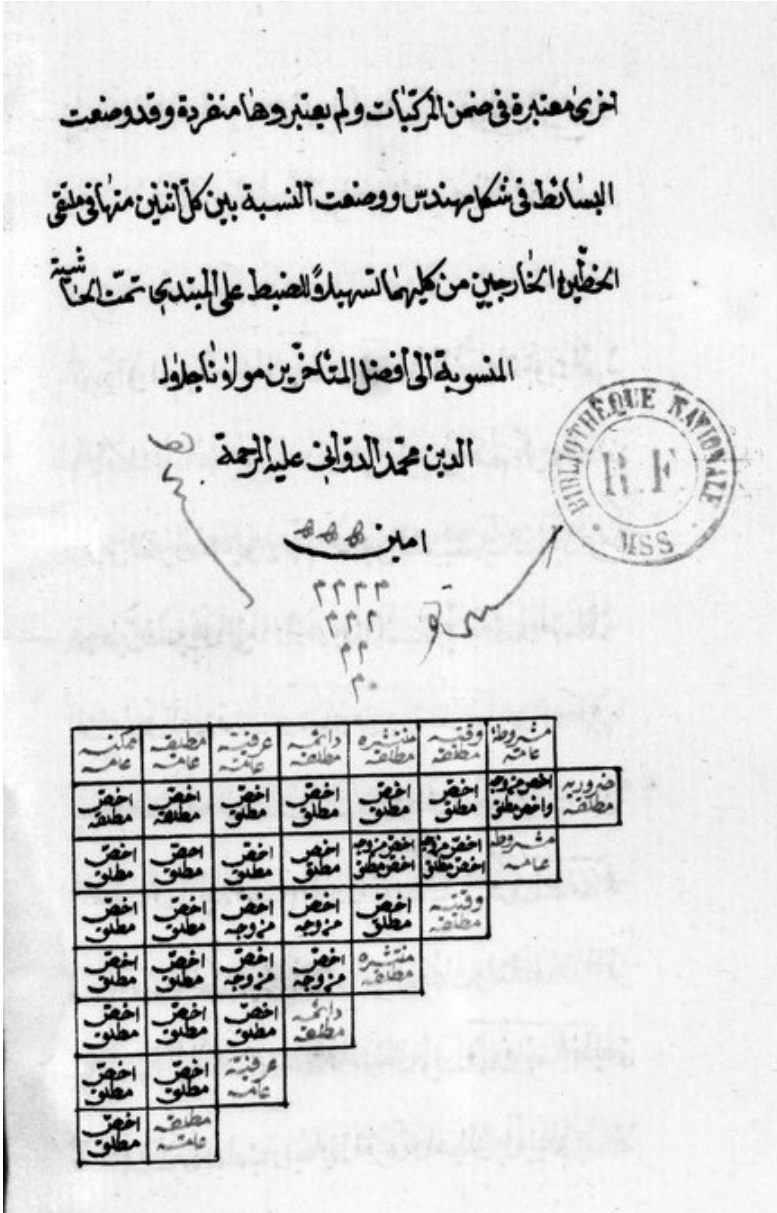امين

٣٣٣٣
٣٣٣
٣٣
٣

Fig. 5. Explicit and triangular table of al-Dawwānī's commentary on al-Taftāzānī's *Tahḏīb*.
Paris, BnF, Arabe 5797, f. 63v, © <www.gallica.bnf.fr>.

Leiden, Ter Lugt 11, see fig. 6), copied in AH 1185 /1771–1772 CE, by Ḥusayn
b. Khalīl b. Ibrāhīm in the Ibn Malik Madrasa in Kütahya (f. 38b) in Western
Turkey. This manuscript contains two textual units: another copy of al-Daw-
wāni's commentary (ff. 1v–38v), along with another anonymous commentary
of al-Taftāzānī's *Tahḏīb* (ff. 42v–157v).

Al-Dawwānī's commentary discusses and elaborates on the combination
of simple propositions (*basāʾiṭ*), assuming that his readership had no need
for definitions. These can, however, be found in al-Taftāzānī's work that is
object of the commentary. In the section devoted to 'asseverations, truthful
statements' (*taṣdīqāt*), he writes:[21]

> If the judgement in the proposition is assessed from the necessity of the relation as
> long as the essence of the subject lasts, then [the proposition] is 'necessary abso-
> lute' (*ḍarūriyya muṭlaqa*); or, if it [the necessity of the relation] lasts as long as its
> property (*waṣf*), then it is called 'conditional absolute' (*mašrūṭā muṭlaqa*); or in a
> specific moment, then it is called 'temporal absolute' (*waqtiyya muṭlaqa*); if instead
> the moment is not specific, then it is called 'generic absolute' (*muntašira muṭlaqa*);
> or if it depends on its permanence as long as the essence lasts, then it is called 'per-
> petual absolute' (*dāʾima muṭlaqa*); or, instead, as long as the property lasts, then it is
> called 'customary absolute' (*ʿurfiyya ʿāmma*); or is from the its efficiency [?], then
> it is called 'absolute and general'; or from the privation of necessity of its contra-
> diction, then it is called 'possible general' (*mumkina ʿāmma*). These are the simple
> propositions (*basāʾiṭ*).

The same triangular table, with the purpose to summarize the ways in
which simple propositions may be combined, appears to be associated with
two different works on the same subject; in the Paris manuscript it is placed at
the end of al-Dawwānī's commentary, whereas in MS Leiden, Ter Lugt 11 the
table follows the anonymous commentary rather than al-Dawwānī's one.

In both manuscript witnesses, the last lines of each text undoubtedly
refer to the table and give a very synthetic description of it. The focus of this
short passage is on the two headers whose intersection defines the space and
cells in which the relation between different couplets of simple propositions
can be framed. The two versions of the text, however, show some interesting
variants. One concerns the wording of the table's description, referred to as
'geometrical figure' (*šakl muhandas*) by one version, while the other depicts
it as a geometrical figure having a toothed edge (*šakl muḍarras handasī*). The
form *muhandas* in the Paris manuscript has a possible relation with *muḍarras
handasī*—as it happens with *mubtadiʾ* and *mutabaddal*—of which could be a

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21   See al-Taftāzānī 1330/1912, 8–9. For the translation of the technical terminology
     of logic, I have mostly relied on the *Online Dictionary of Arabic Philosophical
     Terms* by Andreas Lammer and Raphael Kretz, <http://www.arabic-philosophy.
     com/dict/> (last accessed 25 April 2021).

Fig. 6. Triangular table and the indications about its use it associated to an anonymous commentary on al-Taftāzānī's *Tahḏīb*. ᴍs Leiden, University Library, Ter Lugt 11, f. 158r.

contraction and banalization, but without a complete recension of the manuscript tradition this remains an hypothesis. Both witnesses to the text agree to present this figure as intersection (*mutlaqan*) of rows and columns, and as a tool to facilitate the comprehension of such complex matter.

Ms *Paris BnF Arabe 5797, f. 63v*

So I arranged the basic proposition in a 'geometrical figure' (*šakl muhandas*), and I place the relation between each couplet of them in the intersection of the two external rows [the headers], making it easier for the beginner (*mubtadiʾ*) to grasp.

وقد وضعت البسائط في شكل مهندس ووضعت النسبة بين كل اثنين منها في ملتقي الخطين الخارجين من كليهما تسهيلا للضبط على المبتدئ

Ms *Leiden Ter Lugt 11, f. 38v*

So I arranged the basic proposition in an intersection [of rows and columns], a toothed geometrical figure (*šakl muḍarras handasī*); its peculiarity is in the two external rows, from each of them two derives a facilitation to understand by permutation (*mutabaddal*).

وقد وضعت البسائط في ملتقى شكل مضرس هندسي وصفة منها في خطين الخارجين من كليهما تسهيلا للضبط على المتبدل

As mentioned above, the table announced by al-Dawwānī does directly follow the commentary's text in Ms Ter Lugt 11, though a few blank pages after the colophon offered plenty of space for it. The very same table can be found, instead, after the second text of the Paris multiple-text manuscript, that is the anonymous commentary on al-Taftāzānī's *Tahḏīb*. Also in this case, the conclusion of the text announces the presence of a table, which would exclude the occasional whim of a copyist to attached the table to a different work. The circumstances rather suggest that the unknown author attached the table to his own commentary—nuances and details can be discussed, but the combination of simple propositions remains the same—writing for it a much longer introduction in which he describes the sequence of passages to draw it. A clearly personal and moderately skeptical remark about the content of the commented text introduces the table and anchors it to the rest of the commentary.

Ms *Leiden Ter Lugt 11, f. 157v*

As for the demonstration of contradictions the compound [propositions] (*naqāʾiḍ al-murakkabāt*) and others, than this his discourse [of the author, whose text is commented]; but something, in my mind wondered whether this was not as it should.

اما البيان نقائض المركبات وغيرها فقوله بل شيئا في ظني اه ليس على ما ينبغي

So I arranged the simple propositions in this figure made of six columns (*ḫuṭūṭ mustaqīma*), complete in length (*mutafāwiyya al-ṭūl*), while the extreme point (*qaṣr*) is at the same level at one of the extremities but not at the other.

وقد وضعت البسائط اه هذا الشكل يشتمل على ستة خطوط مستقيمة متفاوية الطول والقصر متوازية في احد الطرفين دون الاخر

On top of the six columns, there is another [row], external to the 'heads' of this columns that intersect their counterparts in the shape of a right-angle[d triangle].

على ستة خطوط مستقيمة أخرى خارجة عن رؤوس تلك الخطوط المتقاطعة بما يوازي منها على زوايا قائمة

The figure should be according to the easiness of impression ['*alā ḥīnat al-ṭab*', easy to understand? easy to draw?]; on the side of the complete 'heads' [header row], make seven cells (*buyūt*) [along the diagonal]—each of them with an isolated corner, not joined with another corner, like isolated branches (*aḫrāṣ*).

فيكون الشكل مثبتا على هيئة الطبع وتحدث في جانب الرؤوس المتناوية سبعة بيوت لكله منها زاوية منفردة غير مقارنة بزاوية أخرى كاخراص منفردة

In these cells [of the header row] there must be the names of the simple propositions in the order in which they were mentioned in the book, apart from the last of them, that is the 'possible general'; on the other side there must be seven cells with the names, starting with first one of them, that is the 'necessary absolute'

في تلك البيوت أسماء البسائط على ترتيب ذكرها في الكتاب غير الأخيرة منها وهي الممكنة العامة ومن جانب أخرى سبعة بيوت فيها أسماء ماعد الأولى منها وهي الضرورية المطلقة

On the other side, there are eight cells; in one of them there is 'possible general', while in the other ['absolute general'], while within the central cells there is the correct relation between each one of the last seven simple propositions.

وفي جانب أخرى ثمانية بيوت في واحد منها اسم الممكنة العامة وفي غيرها [المطلقة العامة] مع البيوت الوسطة النسبة الوافق بين كل واحدة من البسائط السبع الأخيرة

The explanation of the steps to draw the table is rather laborious. The first step is to draw the six columns that have the same elements in both their extremities (cols 2–7), listed in the order in which the propositions appear in the text.[22] The expression *ḫuṭūṭ mustaqīma*, used to refer to the first six elements to draw, could generate some lexical ambiguity and be interpreted either as 'standing rows' (i.e. columns) or as 'straight rows'. Though from other clues in the text, I interpret it as 'columns', it must be admitted that the opposite interpretation would not compromise the drawing of the table, thanks to the correspondence between the sets of rows and columns. The first column is the longest, while the others grow progressively shorter. Then, the header row must be added on top of the 'heads' of the columns, that is the first row, specifying that it should be divided in seven cells. The following step is to add the 'header diagonal'.

22 In the edition of the table, the cells of the headers are respectively associated with numbers and letters in order to facilitate the reference to specific portions of the table itself, see below.

The last element of the header row (8a) and the first element of the 'header diagonal' (1b) are singled out as particular ones, somehow attached and external to the 'core' of the initial six columns. The final version of the table, that is drawn including the two exceptional elements in the headers, ends up to count eight cells in the longest and complete column (8a–h).

Comparing the two witnesses of the table, it is immediately visible how both of them make meaningful use of black and red ink to mark the difference between headers and cells, though with opposite graphic solutions. The table from the Paris manuscript is clearly drawn with the help of a ruler, and all cells are of the same dimension. Whereas the lines of the table in the other manuscript are clearly drawn with a free hand. It seems that the copyist might have started to draw the six central rows—perhaps interpreting *ḫuṭūṭ mustaqī-ma* as rows—but could not manage to keep the cells in line in the upper part of the table (rows a–c) because of more extended portion of text included in some of the cells.

The description of the text states that the header row should have 'possible general' (*mumkina ʿāmma*) as last element, whereas the MS Leiden, Ter Lugt 11 has 'absolute general' (*muṭlaqa ʿāmma*, cell 8a), already present in the cell before the last. The comparison with the MS Paris, BnF, Arabe 5797 confirms the hypothesis of a mistake. Moreover, in the columns 2–3 and 5, the copyist inverts the order of the words in the 'diagonal header', perhaps to create a mirror effect between the header cells of the same column, but the effect is somewhat spoiled by the lack of a systematic application throughout the table.[23] This manuscript has a an additional element, that is a spear-shaped paragraph on the side of the table meant to explain how to concretely use the array, that is from where to start and which elements should be combined one after the other. The content of this short paragraph furtherly confirms that the text in the cell 8a is not the correct one.

What strikes in this table is the rather repetitive contents of the cells, with numerous combinations leading to the same result. This does not have a straightforward correspondence in either text, but I leave this question open for experts in Arabo-Islamic logic.

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23   In the edition, the order of the word follows the normal sequence of adjectives to characterize a simple proposition, as also attested in the Paris manuscript.

Table for the combination of simple proposition in the commentary tradition of al-Taftāzānī's Tahḏīb — *Edition*

	8	7	6	5	4	3	2	1
a	الممكنة العامة	المطلقة العامة	العرفية العامة	الدائمة المطلقة	المطلقة المنتشر	المطلقة الوقتية	المشرطة العامة	
b	اخص مطلق	اخص مطلق	اخص مطلق	اخص مطلق	اخص مطلق	اخص مطلق	مطلق اخص واخص من وجه	**الضرورة المطلقة**
c	اخص مطلق	اخص مطلق	اخص مطلق	اخص من وجه	اخص مطلق واخص من وجه	اخص مطلق واخص من وجه	**المشروطة العامة**	
d	اخص مطلق	اخص مطلق	اخص من وجه	اخص من وجه	اخص مطلق	**المطلق الوقتية**		
e	اخص مطلق	اخص مطلق	اخص من وجه	اخص من وجه	**المنتشر المطلقة**			
f	اخص مطلق	اخص مطلق	اخص مطلق	**الدائمة المطلقة**				
g	اخص مطلق	اخص مطلق	**العرفية العامة**					
h	اخص مطلق	**المطلقة العامة**						

[MS Leiden Ter Lugt 11, f. 158r]

وتوضيح هذه النسبة هو ان يأخذ أولا الضرورة المطلقة مع المشروطة العامة ثم مع الوقتية المطلق ثم مع المنتشرة وهكذا وبعد الاخذ تاخذ المشروطة العامة مع الوقتية المطلقة وما بعدها من المنتشرة المطلقة وغيرها على الكيفية التي ذكرناها أولا وهكذا انجلوا ما في الجانب المتفاوت الخطوط فيه مع ما في الجانب التساوي فانتهائها يكون على المطلقة العامة مع الممكنة العامة

Table for the combination of simple proposition in the commentary tradition of al-Taftāzānī's Tahḏīb — *Translation*

	8	6	6	5	4	3	2	1
a	**Possible General**	**Absolute General**	**Customary General**	**Perpetual Absolute**	**Absolute Generic**	**Absolute Temporal**	**Conditional General**	
b	more particular absolute	more particular absolute	more particular absolute	more particular absolute	more particular absolute	more particular absolute	absolute more particular and more particular from the aspect	**Necessary Absolute**
c	more particular absolute	more particular absolute	more particular absolute	more particular from the aspect	absolute more particular and more particular from the aspect	absolute more particular and more particular from the aspect	**Conditional General**	
d	more particular absolute	more particular absolute	more particular from the aspect	more particular from the aspect	more particular absolute	**Temporal Absolute**		
e	more particular absolute	more particular absolute	more particular from the aspect	more particular from the aspect	**Absolute Generic**			
f	more particular absolute	more particular absolute	more particular absolute	**Absolute Perpetual**				
g	more particular absolute	more particular absolute	**Customary General**					
h	more particular absolute	**Absolute General**						

[MS Leiden Ter Lugt 11, f. 158r]

And the explanation of this relation is to take first the 'necessary absolute' together with the 'conditional general', then with the 'temporal absolute', then with the 'generic absolute' and so on; after this, take the 'conditional general' together with the 'temporal absolute' and what follows—that is the 'generic absolute' and the others—in the way we mentioned at the beginning. And in this way what is on the side of the complete row appears clearly in the rows in which it is, along with what is in the corresponding side, and their last combination is 'absolute general' with 'possible general'.

Concluding notes

Whichever object their shape might recall—teeth, a shawl, or a *minbar*—, triangular tables are drawn only under certain conditions determined by the specific relation between the elements in the headers. Their shape may also be an economical solution to avoid redundances and the presence of non-significant values. The iconic association of this shape with a number of different material referents may point at local traditions or even personal definitions.

A table allows to perform operations and get answers or result without mastering the complex theory behind: being concretely able to use the table is the only requirements. Hence the rather practical and mechanical nature of the indications to use them, to the point of describing the movement of the fingers along rows and columns. This makes tables a particularly suitable tool for teaching and didactic practices, elements which are frequently hinted at in the various indications that accompany the tables.

The internal coherence of the table, defined by the relations between the elements in the headers, allows to emendate by rather safe conjecture some errors and slips of the pen that would be much more difficult to detect in a text in running prose.

The attestation of the table for the combination of simple propositions attached to two different commentaries on the same work shows how elements of fluid tradition can penetrate technical texts in subtle ways; the same table may be a didactic tool generally attached to a certain stream of tradition—in this case commentaries on the same basic text on logic—and may fit more than one composition on the same subject.

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