

# Labeling Religious Affiliation in Ibn Abī Uṣaybi‘a’s *History of Physicians*: A Quest

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In this article, I identify some of the challenges of labeling religious affiliation in a medieval Arabic biographical text. I further propose a solution for characterizing such affiliations in a network or database while preserving the nuances and uncertainties of primary-source evidence.

The goal of the »Communities of Knowledge« project was to observe cross-communal interactions in scholarly circles as represented in the *History of Physicians* by Ibn Abī Uṣaybi‘a (b. after 590 AH/1194 CE, d. 668/1269 or 1270). The network analysis at the core of the project’s large-scale view of these interactions presupposed linking hundreds or even thousands of individuals mentioned in the text to their various religious communities.

Fundamentally, this linking involves two steps: (1) inferring an individual’s religious affiliation from the text and (2) making this inference accessible to the network analysis in the recording system. Both steps raise challenges. At the inference step, the concepts of religion and group adherence must be contextualized in Ibn Abī Uṣaybi‘a’s text. Here I explore his explicit, implicit, and ambiguous references to affiliation.

At the recording step, a labeling system should allow varying levels of precision for the affiliation, should show the type and certainty of the »signal« (the evidence for inferring the affiliation), and should record multiple signals of a person’s affiliation where present, even if these appear contradictory. The model I propose with TEI-XML examples makes multiple signals and their attributes machine-actionable.

Finally, I consider how this model relates to the possibility of machine labeling affiliations with named entity recognition (NER). Arabic NER models do not currently include entity types for religious affiliation, but the tagged text of the *History of Physicians* could help to train NER models on the nuances of religious affiliation in medieval Arabic texts.

*Keywords: religion and religious identity, interreligious relations, Near East/Middle East, digital humanities, Arabic onomastics, Abrahamic religions, Abbasid caliphate (132-656 AH/750-1258 CE), Arabic, biographical literature, Ibn Abī Uṣaybi‘a (b. after 590 AH/1194 CE, d. 668/1269 or 1270), network analysis, TEI-XML, named entity recognition (NER)*

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**Introduction: ‘Uyūn al-anbā’ (History of Physicians)**

The frequent, even daily and unremarkable, contact among several religious groups in the medieval Near East is reflected in myriad texts beyond the confines of religious genres – including in biographical works. These recount interactions not only between members of the three major monotheistic or »Abrahamic« religions – Judaism, Christianity, and Islam – who have lived side-by-side for many centuries in and beyond the areas where they trace the roots of their respective faiths, but also between a number of other groups, including Zoroastrians, Manichaeans, Samaritans, and Harranian pagans or »Sabians«.

Among medieval biographical texts in Arabic, ‘*Uyūn al-anbā’ fī ṭabaqāt al-aṭibbā’* (literally, »Choice accounts of the classes of physicians«, hereafter abbreviated as *History of Physicians*) by the Syrian physician Ibn Abī Uṣaybi‘a (born after 590 AH/1194 CE, died 668/1269 or 1270) is perhaps unequaled in the extent to which it details the social interactions of scholars from many different religious communities. Works in this *ṭabaqāt* genre tend to present a kind of »who’s who« resource, collecting information about personages in particular categories such as hadith transmitters or poets. While some of these categories were applicable especially within specific religious traditions, Ibn Abī Uṣaybi‘a’s project outlined a profession (medicine and related areas) in which collaboration and exchange *across* different communities was typical. The *History of Physicians* is thus an ideal source for analyzing interreligious knowledge exchange on a large scale, as undertaken by the project »Communities of Knowledge« (usaybia.net).<sup>1</sup> As a textual basis for this analysis, the recently published critical edition and translation of Ibn Abī Uṣaybi‘a’s work (*A Literary History of Medicine*, hereafter »LHOM«) was especially suitable since it is available for download and reuse as open-access under a CC-BY-NC license.<sup>2</sup>

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- 1 For a more detailed introduction to the *History of Physicians*, see Vernet, Ibn Abī Uṣaybi‘a; the introductory essays in Ibn Abī Uṣaybi‘a, *‘Uyūn al-anbā’*, ed. and trans. Savage-Smith *et al.*; and the report about the »Communities of Knowledge« project in the present volume (Gibson and Schmahl, Communities of knowledge).
  - 2 Ibn Abī Uṣaybi‘a, *‘Uyūn al-anbā’*, ed. and trans. Savage-Smith *et al.* This is also the source of translated quotations below, unless otherwise noted.

The project's overall aim prompted the need to find a way to label the religious affiliation of persons mentioned in the *History of Physicians* and to address the methodological considerations that go along with such a labeling system. On the whole, the »Communities of Knowledge« project aimed to examine the specific people, places, and types of interactions that function to bridge religious communities as represented in Ibn Abī Uṣaybī'a's text.<sup>3</sup> The project team identified the persons and places mentioned in chapters 8-15 of Ibn Abī Uṣaybī'a's text in order to construct networks revealing how the author depicts the interactions of these persons throughout his text.<sup>4</sup> But in order to be able to isolate cross-communal interactions in the network, it is necessary to be able to link at least a substantial portion of the approximately 3,000 individuals mentioned in the text to their respective religious communities. Thus, the goal of labeling persons with religious affiliations is to make the interreligious dimensions of these networks visible. The question for this paper is: How can this be done in a way that corresponds to the nuances of religious affiliation as perceived and recorded by Ibn Abī Uṣaybī'a?<sup>5</sup>

Below, I discuss the two steps involved in this linking: (1) inferring an individual's religious affiliation from the text; and (2) making this inference accessible to the network analysis in the recording system. Regarding the first step, I use examples and data from the *History of Physicians* to explore how a person's religious affiliation can be determined from the text amid ambiguities and conceptual problems (such as multiple affiliation). For the second step, I describe the requirements for a system to record these determinations, and I propose a model intended to meet these requirements. As a final reflection, I consider how this two-step process relates to automated tagging through named entity recognition (NER). Arabic NER models cannot yet be used in their off-the-shelf form for labeling religious affiliations, but it is conceivable to train a model on the manually tagged text of the *History of Physicians* in order to further develop Arabic NER capabilities.

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- 3 This goal had to do not with proving *whether* such cross-communal collaboration took place (indeed, one might argue it was unexceptional at the time), nor with determining *to whom* the scholarly achievements of this period belong, but rather with examining *how* this collaboration took place on an interpersonal level. See Gibson, Knowledge collaboration, 60-65.
  - 4 See the project report in this volume (Gibson and Schmahl, Communities of knowledge) for more details about identifying persons in the text and constructing networks from these identifications.
  - 5 The network constructed from the *History of Physicians* is meant as a tool for analyzing Ibn Abī Uṣaybī'a's assertions. It is not in itself a historical-critical model.

*Inferring Religious Affiliation in the History of Physicians: Toward a Working Definition*

The challenge of linking historical persons to religiously delineated groups begins with the question of how terms such as »religion« and its corollaries »religious identity«, »religious adherence«, and »religious belonging« should be applied to medieval Near Eastern texts. The modern definitions of these terms are actively debated in the sociology of religion.<sup>6</sup> But – more to the point – although there is some consensus that the modern concept of religion should be applied only with careful adaptation (if at all) to medieval discussions,<sup>7</sup> there has been little progress, as far as I can find, in determining in practical terms what should be seen as indicators of religious affiliation in medieval Near Eastern texts, that is, what its indicators might be. This is needed for any broad-scale study that would map these communities through their individuals – through their inclusion and exclusion, what connected or isolated them – in the abundant literary works and documentary texts that survive to describe persons from this region and time period. Without knowing clearly how to detect and mark religious affiliation, we are limited to guessing at larger patterns or confining ourselves to only the clear-cut cases in which terms such as »Jewish« or »Muslim« describe persons in source texts.<sup>8</sup>

Regardless of this lack, many insights into cross-communal interactions have been possible from studies in a number of areas: religious jurisprudence,<sup>9</sup> polemical exchanges,<sup>10</sup> intertextuality in the exegesis of scripture and its narrative retellings,<sup>11</sup> and others. Moreover, the light that documentary and legal texts have shed on daily life has led to questioning the rigid boundaries that have sometimes been assumed for religious communities. But for approaches such as prosopography or network analysis that work from references *about individual persons* toward a larger whole, systems must exist for labeling religious affiliation if interreligious dimensions are to be taken into account.

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6 For a summary of some of these debates, see Berger, *Some second thoughts*; Bruce, *Defining religion*; K nemann, *Religion*.

7 See, most helpfully, the brief discussion and references in Weltecke, *Über Religion vor der »Religion«*, 13-15 and n. 3; as well as Bruce, *Defining religion*, 107-108; K nemann, *Religion*, 1-2; and, for a book-length treatment, Nongbri, *Before Religion*.

8 Gero Menzel has brought to my attention that membership categorization analysis could provide a profitable methodological comparison for my approach (*pers. comm.*, 23 May 2023; see Silverman, *Harvey Sacks*, 74-97). Unfortunately, I have not yet been able to explore this line of inquiry.

9 E.g., Rustow, *Legal status*; Weitz, *Between Christ and Caliph*; and the special issue Tillier, *Le pluralisme judiciaire*.

10 Thomas and Roggema, *Christian-Muslim Relations 1*; Thomas *et al.*, *Christian-Muslim Relations 2*; Thomas and Mallett, *Christian-Muslim Relations 3*.

11 E.g., Islamic apologetic use of the Gospels (Accad, *Gospels in the Muslim discourse*), Islamic tellings of the stories of the prophets in the *q     al-anbiy  * genre (Nagel, *Q     al-Anbiy  *), and the Jewish exegete Saadiah Gaon's attention to Islamic theology (Freidenreich, *Use of Islamic sources*).

Defining what should be considered religious affiliation in the History of Physicians involves, first of all, disentangling the concept of »religion« from modern preconceptions. Indeed, it is debated when and where the idea took shape that a single term such as »religion« could encompass a plurality of systems of belief and practice.<sup>12</sup> Put differently, by the seventh/thirteenth century, when Ibn Abī Uṣaybī'a was writing, could his descriptions of people as »Muslim«, »Christian«, »Jewish«, or »Zoroastrian« be understood as comparable terms within a single category?

Several centuries before the period of interest, in the early centuries of Islamic rule, the encounters of groups having partially conflicting and exclusivist beliefs had already prompted comparative projects, such as that of Theodore Abū Qurra (d. after 213?/829?). As the Christian Melkite (Byzantine Orthodox) bishop of cosmopolitan Harran, Theodore imagined what it would be like for a man who grew up on a mountain away from society to come into contact with people »in their differing religions« (*fī adyānin mukhtalifatin*).<sup>13</sup> He goes on to describe how each »people from« (*qawm min*) the pagans, Zoroastrians, Samaritans, Jews, Christians, Manichaeans, Marcionites, Bardaisanites, and Muslims would attempt to recruit the newcomer to their group through their self-descriptions.<sup>14</sup> Here it is not my purpose to resolve whether Theodore or others of his time used the Arabic word *dīn* (pl. *adyān*) analogously to the term »religion« in its modern sense.<sup>15</sup> Rather, it is sufficient to note that, already at this time, an author might subdivide his society into groupings that today we would call »religious«, and that he seems to have considered these groups to be exclusive alternatives to one another.

Muslim writers in the third/ninth and fourth/tenth centuries wrote works describing the beliefs of various non-Muslim communities (*ghayr al-Islāmiyyīn*), but little survives from these.<sup>16</sup> Remnants of a work by al-Nashī' al-Akbar (d. 293/906) and the section of 'Abd al-Jabbār's (c. 325-415/937-1024) *Mughnī fī abwāb al-tawhīd wa-l-'adl* (Compendium on the pillars of oneness and justice) dealing with religious sects show systematic heresiographic attempts that would later be seen in better known books in this vein by Ibn Ḥazm (384-456/994-1064) and Abū al-Faḥ Muḥammad al-Shahrastānī (b. 479?/1086 or 1087?, d. 548/1153). These efforts at clarifying which theologically distinctive features should be assigned to particular groups show that, at least on this level, categorizing people into communities of belief was conceivable long before the time of Ibn Abī Uṣaybī'a.

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12 As Weltecke, *Über Religion vor der »Religion«*, has shown, current research on the origin of the concept has been too confined to studying the Latin term *religio* while neglecting more relevant terms such as *lex* as well as Arabic and other West Asian conceptions such as *milla* and *dīn*.

13 Abū Qurra, *Traité de l'existence du créateur*, ed. Dick, 200.

14 Abū Qurra, *Traité de l'existence du créateur*, ed. Dick, 200-210.

15 On this, see briefly Weltecke, *Über Religion vor der »Religion«*, 24.

16 Thomas, *Christian Doctrines*, 20-22.

While Theodore's project and those of the abovementioned Islamic heresiographers aimed at theological persuasion, the religious categories they describe had more than just a theological import. Legal reasoning in a variety of traditions demarcated these groups, perhaps establishing relevant social categories or perhaps reflecting and reinforcing existing ones. Islamic jurists attempted to make group membership a criterion for rules regarding taxation, marriage, inheritance, and other areas – differentiating not only between Muslims and non-Muslims, but also between Scripture people (*ahl al-kitāb*, literally »People of the Book«), protected people (*ahl al-dhimma*), and others.<sup>17</sup> Christian bishops in canon law texts barred their parishioners from giving their daughters in marriage to outsiders (under threat of excommunication), and Jewish leaders did similarly in their responsa. Even supposing that such rules were idealistic and written to erect or reinforce boundaries that in practice were not maintainable, they reflect the thinking that each person *could* be assigned to one of a set of mutually exclusive legal categories corresponding to real-life communities.

With these theological and legal perspectives in the background, I find the term »religious affiliation« more applicable to medieval Near Eastern biographical descriptions than »religious identity«, »religious adherence«, or »religious belonging«. These latter carry with them a sense of self-identification and self-determination that would be anachronistic, especially for a text such as Ibn Abī Uṣaybi'a's, which typically reports affiliations as observations or social perceptions rather than as first-person descriptions by the historical subjects themselves. For example, imagine a woman whose Christian parents baptized her as a child. She then marries a Muslim man, probably by the arrangement of the families. It is unlikely that she herself will at any point determine whether others perceive her as a Christian or Muslim. Moreover, her children will be considered Muslim because of their Muslim father. Except in the unusual case that her own statements are reported, it would be tenuous to say that she identifies as Christian or Muslim, or that she adheres to Christianity or Islam, because these would imply that this determination comes through what she says about her own beliefs and practice. An »affiliation« with one of these groups, on the other hand, means only that someone (whether she herself or others) sees her as belonging to that group.

Thus, the working definition of »religious affiliation« that I would apply to Ibn Abī Uṣaybi'a's *History of Physicians* is »perceived belonging to a group with theological and social distinctions that are typically exclusive«. <sup>18</sup> By the term »interreligious«, I correspondingly intend, »between differing religious affiliations«. This definition is starkly different from some modern conceptions, in which religion may be individually chosen and comprise highly personal and perhaps idiosyncratic elements.<sup>19</sup> Significantly, this definition also makes no assumptions about a person's individual beliefs and practices (although the group as a whole is expected to hold to some theological distinctions), nor does it directly relate to phenomenological descriptions (such as encountering »the numinous«).

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17 In general on this topic, see Levy-Rubin, *Non-Muslims in the Early Islamic Empire*; Simonsohn, *A Common Justice*; Fattal, *Le statut légal*; Freidenreich, Christians in early and classical Sunnī law.

18 The »perception« in this case is that of the narrator (Ibn Abī Uṣaybi'a) or that of the speaker he cites.

19 For the modern concept of »religion«, see Nongbri, *Before Religion*.

As discussed below, »perceived group belonging« fits the way Ibn Abī Uşaybī'a uses explicit designations such as »Muslim« or »Jewish«, for example, as well as the slightly more subtle indications he gives using occupational descriptors (»qadi«, »priest«) or family connections. It also fits the wide range of beliefs and practices attributed in his work to members of each group, in which a subject's personal piety was not at issue in the categorization. For example, the eminent physician Yūḥannā ibn Masawayh (d. 243/857) is commonly spoken of as being part of the Christian community, and Ibn Abī Uşaybī'a quotes certain biographers that explicitly call him a »Christian« and a deacon. Yet his biography in the *History of Physicians* hardly presents a pious believer.<sup>20</sup> Once while he was suffering from a deathly illness, he reportedly fumed at the monks gathered around his bed to pray for him, »One drop of rose-perfume is better than the prayers of all the people of Christendom from the beginning to the day of Resurrection. Get out of my house!«<sup>21</sup> When reproved for taking concubines, he responded to the catholicos (head of the Church of the East) with obscene insults.<sup>22</sup> Yet Ibn Abī Uşaybī'a never suggests that Yūḥannā ibn Masawayh was not a Christian. On the other end of the spectrum of Christian piety was Abū al-Faraj ibn al-Ṭayyib (d. 435/1043).<sup>23</sup> Besides being a respected physician, he was secretary to the catholicos, a practicing priest, and a Bible commentator. Ibn Abī Uşaybī'a calls him *al-imām* (translated by Savage-Smith *et al.* as »paragon«). Clearly, for Ibn Abī Uşaybī'a, terms like »Christian« indicated the community to which someone belonged, not their beliefs and practices.

#### *Inferring Religious Affiliation in the History of Physicians: Exploring Ibn Abī Uşaybī'a's Usage*

With a working definition in hand, it is now time to see what terms Ibn Abī Uşaybī'a uses for religious affiliation in the *History of Physicians* and the challenges these might present for constructing a system to represent that usage. Such a system should reflect the nuances, uncertainties, contradictions, and even misperceptions of religious affiliation in the text rather than flattening them. The following shows some of the ways Ibn Abī Uşaybī'a speaks of religious affiliation, both directly and indirectly.

1. *Explicitly religious descriptions:* As explicit indications, Ibn Abī Uşaybī'a sometimes provides a religious adjective, either attached directly to the person's name (a *nisba*) or as a description of the person, such as *al-Naṣrānī* or *al-Masīḥī* (»the Christian«), *al-Yahūdī* (»the Jew«), or *al-Isrā'īlī* (»the Israelite«). For example, in the entry for Abū al-Barakāt ibn Sha'yā, the author specifies that the latter was a »Karaites Jew« (*wa-kāna Yahūdiyyan Qarā'an*).<sup>24</sup> *Nisba* designations for non-Muslims are common in other Islamic texts, but Ibn Abī Uşaybī'a employs them sparingly, even when he apparently knows the person's affiliation and indicates it in other ways.

20 Ibn Abī Uşaybī'a, *Uyūn al-anbā'*, ed. and trans. Savage-Smith *et al.*, sec. 8.26.

21 Ibn Abī Uşaybī'a, *Uyūn al-anbā'*, ed. and trans. Savage-Smith *et al.*, sec. 8.26.7.

22 Ibn Abī Uşaybī'a, *Uyūn al-anbā'*, ed. and trans. Savage-Smith *et al.*, sec. 8.26.8.

23 His biography appears in Ibn Abī Uşaybī'a, *Uyūn al-anbā'*, ed. and trans. Savage-Smith *et al.*, sec. 10.37.

24 Ibn Abī Uşaybī'a, *Uyūn al-anbā'*, ed. and trans. Savage-Smith *et al.*, sec. 14.41. This biography only appears in versions 1 and 3 (see n. 1 there). On Abū al-Barakāt, see Pines, *Abu 'l-Barakāt*.

At times, Ibn Abī Uṣaybi‘a seems to mention someone’s affiliation because it relates to the person’s biography, including in cases of conversion. He says Abū al-Barakāt Hibat Allāh al-Baghdādī (b. c. 470/1077, d. after 560/1164 or 1165) »was a Jew who subsequently became a Muslim« (*kāna Yahūdiyyan wa-aslama ba‘da dhālika*).<sup>25</sup> Throughout the biography, his former Jewish affiliation and his conversion feature large. The vizier al-Ṣāhib Amīn al-Dawla (d. 648/1250 or 1251) »was a Samaritan who converted to Islam under the name Kamāl al-Dīn« (*kāna Sāmīriyyan wa-aslama wa-luqqiba bi-Kamāl al-Dīn*).<sup>26</sup> His uncle is given the *nisba al-Sāmīrī* (»the Samaritan«). A final example is Amīn al-Dawla ibn al-Tilmīdh, whose *non-conversion* is emphasized, saying he »died as a Christian« (*wa-māta Naṣrāniyyan*).<sup>27</sup> Except in cases of conversion, Muslims are rarely designated as *Muslim*, an omission that is common in other Islamic texts as well.

2. *Religious offices and occupations*: More frequent than explicit *nisba* or adjectival designations are references to someone’s religious office or occupation, which clearly marked their religious affiliation for Ibn Abī Uṣaybi‘a’s readers. Qadis and caliphs can be presumed Muslim, while patriarchs, metropolitans, bishops, priests, and monks can be presumed Christian.<sup>28</sup>

3. *Indirect indications through family relations*: In other cases, the indications are scattered and less direct, but may be enough to infer an affiliation when taken together. This is the case in Ibn Abī Uṣaybi‘a’s biographies of ‘Abd Allāh al-Ṭayfūrī (active late second/eighth century), his son Zakariyyā, and his grandson Isrā‘īl.<sup>29</sup> None of these biographies of the family’s three generations mention the affiliation of the main subjects. However, the entry for the Christian physician Yūḥannā ibn Masawayh tells about the family’s relationship to the latter.<sup>30</sup> ‘Abd Allāh, it turns out, was Ibn Masawayh’s father-in-law. If ‘Abd Allāh and his daughter were Muslim, it would be very unlikely for her to be given in marriage to a Christian man. The account thus implies their Christian affiliation.<sup>31</sup> Moreover, ‘Abd Allāh lived next to Yūḥannā in the »Christian quarter« of Baghdad and one of his sons, Dāniyal, became a monk. In the biography of Ḥunayn ibn Ishāq, ‘Abd Allāh’s grandson Isrā‘īl is reported to have been a Christian who created a conflict with Ḥunayn and then called for him to be tried by a Christian tribunal.<sup>32</sup> Ultimately, the catholicos got involved, suggesting that Isrā‘īl, like Ḥunayn, was probably affiliated with the Church of the East. On the basis of the affiliation of his descendants and (more weakly) his place of residence, it is reasonable to conclude that ‘Abd Allāh and his mentioned descendants were Christians, likely of the East Syriac variety. This affiliation is one that Ibn Abī Uṣaybi‘a’s readers would have easily inferred from the contextual clues he provided.

25 Ibn Abī Uṣaybi‘a, *‘Uyūn al-anbā’*, ed. and trans. Savage-Smith *et al.*, sec. 10.66.

26 Ibn Abī Uṣaybi‘a, *‘Uyūn al-anbā’*, ed. and trans. Savage-Smith *et al.*, sec. 15.49. Ibn Abī Uṣaybi‘a’s attention to this case could be due to the fact that he was the dedicatee of one version of the *History of Physicians* (my gratitude to Nadine Löhr for this comment on an earlier draft of this article; see Ibn Abī Uṣaybi‘a, *‘Uyūn al-anbā’*, ed. and trans. Savage-Smith *et al.*, Preface and sec. 15.49.1).

27 Ibn Abī Uṣaybi‘a, *‘Uyūn al-anbā’*, ed. and trans. Savage-Smith *et al.*, sec. 10.64.16.

28 Terms for unambiguously Jewish religious offices seem to be rare in the *History of Physicians*.

29 Ibn Abī Uṣaybi‘a, *‘Uyūn al-anbā’*, ed. and trans. Savage-Smith *et al.*, secs. 8.10-12.

30 Ibn Abī Uṣaybi‘a, *‘Uyūn al-anbā’*, ed. and trans. Savage-Smith *et al.*, sec. 8.26 and see above.

31 Muslim men marrying Christian women was juristically and socially a different matter and was far more likely.

32 Ibn Abī Uṣaybi‘a, *‘Uyūn al-anbā’*, ed. and trans. Savage-Smith *et al.*, sec. 8.29.12 and n. 64. Ibn Abī Uṣaybi‘a reports this from Ibn Juljul, *Ṭabaqāt al-aṭibbā’*, ed. Fu‘ād, 69-70 (and compare al-Qiftī, *Ibn al-Qiftī’s Ta’rīh al-ḥukamā’*, ed. Müller and Lippert, 172).



The following affiliations of family members are ones I have taken to be indirect indications of a subject's own affiliation in the *History of Physicians*, due to prevalent legal practices and social mores:

1. Father's affiliation
2. Affiliation of child (for male subjects)
3. Non-Muslim affiliation of husband
4. Muslim affiliation of wife

4. *Names used predominantly by particular groups*: To the above indications could be added certain names, if it could be shown that their usage is nearly exclusive to a particular community. These would provide a weak signal of someone's affiliation at birth.<sup>33</sup>

Such a list can, in fact, be cautiously compiled from the Onomasticon Arabicum (OA), a digital publication of the French Centre national de la recherche scientifique (CNRS), which is based on a number of Arabic biographical dictionaries. Precisely because entries in this database sometimes record the religious affiliations mentioned by biographers, it is possible to get a basic idea of which names were in use in which communities and, especially, which names were or were not used by Muslims. Each record is essentially an attestation of a person's name and other biographical information mentioned in a particular source. In the field »DIN«, OA lists any religious labels mentioned by the source or »deduced« by the person recording the data.<sup>34</sup> Of about 13,500 attestation records, there were approximately 6,500 affiliation labels.<sup>35</sup> By listing all of these and classifying them into »macro-affiliations« such as Muslim, Christian, Jewish, Zoroastrian, and so on, I was able to compile usage statistics for each name showing the number of times it occurred for each macro-affiliation. Some important caveats are in order. Persons labeled with non-Muslim affiliations make up only a tiny proportion of the dataset (e.g., Christian: 93 records or 0.7%; Jewish: 31 records or 0.2%). Also, the vast majority of records are for men and, by virtue of being derived from biographical dictionaries, mostly prominent men.

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33 The idea of tracing religious affiliation through onomastic data shares some things in common with Bulliet's well-known attempt to determine the rate of conversion to Islam in Iran using the names appearing in successive generations of each family (Bulliet, *Conversion*; for more recent evaluations of this attempt, see Harrison, *Behind the curve*; Bulliet, *Conversion curve revisited*). Given the broad scope of Ibn Abi Uṣaybi'a's *History of Physicians* with regard to time, regions, and cultures, I believe it is prudent to be particularly cautious about which names imply a Muslim affiliation and how certainly they do so.

34 Given that the Onomasticon Arabicum focuses on Islamic sources and persons and that religious affiliation is not collected systematically, this resource should be used especially for attestations of names in Muslim communities and only cautiously regarding other communities. Many of the labels in the DIN field are intra-Islamic references to a juristic school or a Sufi *ṭarīqa* (»path«). Discussion of how this field is used can be found in Müller *et al.*, *Onomasticon Arabicum. La base de données OA-online*, 9, 12, 19-20; and in a history of the database in Müller, *Onomasticon Arabicum: A historical survey*.

35 The data cited here from OA were accessed in 2017.

Table 1: Names attested more than 100 times for Muslims in the *Onomasticon Arabicum*.

Name	Occurrences among Muslims
Muḥammad	1255
Aḥmad	585
‘Alī*	390
‘Abd Allāh*	240
Ibrāhīm*	189
‘Abd al-Raḥmān	171
al-Ḥasan*	114
Ismā‘īl*	102

The three names without an asterisk – Muḥammad, Aḥmad, and ‘Abd al-Raḥmān – are ones that could be seen to have a particularly Islamic valence in contrast to, for example, ‘Abd Allāh (»slave of God«) or Ibrāhīm (Abraham), which might be seen as generally monotheistic. Thus, I take these three names as weak indicators of a person’s Muslim affiliation at the time the name was given.

We can also see which names are *not* present in the nearly 6,000 attestations for Muslim men. I have classified these by Christian or Jewish usage, but it should be noted that, due to the small number of Christian and Jewish affiliations in OA, no conclusions can be drawn about which names were actually common in these communities. Moreover, of the names that occur only once in OA, I have excluded those I consider to be unusual and likely to be seen only in connection to one particular individual (e.g., Masawayh). Table 2 provides the names occurring among Christians but not Muslims.

Table 2: Names occurring among Christians but not Muslims according to attestations in the *Onomasticon Arabicum*.

Name	Occurrences among Christians
Yūḥannā/Yuḥannā	4
Bukhtishū‘	3
Isrā‘īl*	2
Jibra‘īl	2
Jūrjis/Jurjis/Jirjis	2
Mikhā‘īl	2
Būluṣ	1
Iṣṭīfan	1
Mārī	1
Masiḥ	1
Mattā	1
Nasṭās	1
Sarjis	1
Tiyādūrus/Tayādūrus	1
Yūwānīs	1

The asterisk (\*) indicates I have disregarded the name *Isrā'īl* as a particularly »Christian« name, because I consider it likely to also occur in Jewish communities, even though it is not attested as Jewish in OA. Most of the other names could be seen as having a particularly Christian valence: names of New Testament characters or Christian saints or names that refer to »Christ« (*Masiḥ*) or to »Jesus« in Syriac (*Īshū'*).<sup>36</sup>

Because of the small number of Jewish attestations (31), there are fewer »non-Muslim« names attested as Jewish in OA, as seen in Table 3.<sup>37</sup>

Table 3: Names occurring among Jews but not Muslims according to attestations in the *Onomasticon Arabicum*.

Name	Occurrences
Ḥasdāy	2
Ṣafiyya	1
Minaḥim	1

Among the onomastic data from OA and the text of the *History of Physicians*, there are also some surprises with regard to affiliation. Names one might have thought to have a particularly Islamic valence were sometimes used also among non-Muslims, such as 'Alī, al-Ḥasan, and 'Abd Allāh. Moreover, names one might guess to indicate a Jewish affiliation such as *Isrā'īl* and *Hibat Allāh* (the equivalent of Nathaniel) were in use among Christians, perhaps because they were also biblical names. This points to the importance of using attestation statistics to test assumptions about the religious valence connected to names.

In contrast to names, honorific titles seem of limited use as affiliation signals. Titles one might expect to be reserved for Muslims are also given to non-Muslims in Ibn Abī Uṣaybī'a's account. The *kunya* – that is, the title Abū [X] (»father of [X]«) or Umm [X] (»mother of [X]«) – is a customary form of respect, but one prohibited by certain versions of the so-called Pact of 'Umar, the document supposed to outline the agreements made between Muslims and conquered non-Muslim protected peoples (*ahl al-dhimma*).<sup>38</sup> The provisions in the Pact of 'Umar were very often disregarded, and this is illustrated by the high frequency of *kunya* titles for non-Muslims in the *History of Physicians*. The presence of a *kunya* may in fact not indicate anything useful regarding a person's affiliation.

36 The Syriac *Īshū'* for Jesus is in contrast to the quranic name for Jesus, 'Īsā, which was not uncommon among Muslims. If *Masiḥ* and *Bukhtishū'* can be regarded as indicators of a Christian affiliation, then similar names could probably be included in this category as well: *Īshū'*, *Sabrishū'*, and 'Abd al-Masiḥ. A good source to supplement Arabic names attested among medieval Christians would be the *Syriac Biographical Dictionary* ([syriaca.org/persons](http://syriaca.org/persons)), which has records for persons connected to the Syriac communities. The few records relating to non-Christian affiliations would need to be manually excluded and the remaining names filtered according to whether they have Muslim attestations in OA.

37 For Jewish names, a good supplement could be the descriptions of Arabic items from the Cairo Genizah available from the Cambridge Digital Library ([cudl.lib.cam.ac.uk/collections/genizah](http://cudl.lib.cam.ac.uk/collections/genizah)). Names would need to be extracted from the descriptions and persons known to be non-Jewish excluded. Then the list could be compared with OA and the *Syriac Biographical Dictionary* to determine which names are attested only for Jewish affiliations, not Muslim or Christian.

38 See Ibn Ḥanbal's version of the pact (Ibn Ḥanbal, *Aḥkām ahl al-milal*, ed. Khallāl and Ḥasan, 357-359) and compare Levy-Rubin, *Non-Muslims in the Early Islamic Empire*, 149.

Even more surprisingly, honorific titles with an apparent Islamic valence such as al-Dawla («of the state») or al-Dīn («of the religion») are also given to non-Muslims in the *History of Physicians*. The Christian physician Ibn al-Tilmīdh famously bore the title Amīn al-Dawla («trusted of the state») along with an additional title, Muwaffaq al-Mulk («successful of the reign»).<sup>39</sup> Two physicians with Samaritan *nisab* (sg. *nisba*), Yūsuf ibn Abī Saʿīd and Yaʿqūb ibn Ghanāʾim, are mentioned with the titles Muhadhdhab al-Dīn («refined of the religion») and Muwaffaq al-Dīn («successful of the religion»), respectively.<sup>40</sup> The Jewish physician Ibn Abī al-Bayān had the title Sadīd al-Dīn («correct of the religion»).<sup>41</sup> The Christian physician Yaʿqūb ibn Siqlāb and the Christian scribe Ibn al-Būrī are both given the title Muwaffaq al-Dīn.<sup>42</sup> Yaʿqūb ibn Ishāq was a Jewish physician with the title Asʿad al-Dīn («happiest of the religion»).<sup>43</sup> The «al-Dīn» titles for non-Muslims occur especially in chapters 14-15, dealing with late Abbasid Egypt and Syria, including the Mamluk and Ayyubid periods, where Ibn Abī Uṣaybiʿa relies heavily on reports from his own networks. This might merely reflect the overall popularity of such titles in these regions and time periods, or it might have to do with the author preserving respectful forms for people connected to his circle of acquaintances.

To summarize, the indicators of religious affiliation in the present analysis of Ibn Abī Uṣaybiʿa's *History of Physicians* are as follows:

1. Explicit statements of a subject's affiliation or conversion
2. Offices or occupations held by the subject that are unique to a particular affiliation
3. Family relations
  - a. Father's affiliation
  - b. Affiliation of child (for male subjects)
  - c. Non-Muslim affiliation of husband
  - d. Muslim affiliation of wife
4. Names used predominantly by particular groups

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39 Ibn Abī Uṣaybiʿa, *ʿUyūn al-anbāʾ*, ed. and trans. Savage-Smith *et al.*, sec. 10.64.

40 Ibn Abī Uṣaybiʿa, *ʿUyūn al-anbāʾ*, ed. and trans. Savage-Smith *et al.*, secs. 15.48, 15.59.

41 Ibn Abī Uṣaybiʿa, *ʿUyūn al-anbāʾ*, ed. and trans. Savage-Smith *et al.*, sec. 14.43.

42 Ibn Abī Uṣaybiʿa, *ʿUyūn al-anbāʾ*, ed. and trans. Savage-Smith *et al.*, sec. 15.23.2.2.

43 Ibn Abī Uṣaybiʿa, *ʿUyūn al-anbāʾ*, ed. and trans. Savage-Smith *et al.*, sec. 14.42.

*Inferring Religious Affiliation in the History of Physicians: Contradictory Indications*

Over and above the challenges of understanding Ibn Abī Uṣaybī'a's contextual presentation of someone's religious affiliation is the problem of the author's own uncertain or contradictory information in certain cases.

One example is the biography of biography of Rabban al-Ṭabarī (active in the late second/eighth and the early third/ninth centuries, father of the famous physician and convert to Islam 'Alī ibn Rabban al-Ṭabarī, b. 165?/781?, d. after c. 241/855), which he quotes without correction from Ibn al-Qiftī. It is asserted that Rabban al-Ṭabarī was Jewish because his title »Rabban« sounded similar to »Rabbi«. <sup>44</sup> This is despite the fact that Ibn Abī Uṣaybī'a knows »Rabban« could be a title of respect among East Syriac Christians, having recorded this in an account of Yūsuf ibn Ibrāhīm ibn al-Dāya (active in the late third/ninth cent.) regarding Jibril ibn Bukhtīshū' and Ḥunayn ibn Ishāq. <sup>45</sup> Perhaps he overlooked this inconsistency, leaning too heavily on his sources, or perhaps he preferred to let his sources speak for themselves in this case without intervening. Ibn Abī Uṣaybī'a's presentation of Rabban al-Ṭabarī therefore involves both a Jewish affiliation and, less directly, a Christian one.

At times, Ibn Abī Uṣaybī'a marks his uncertainty, as in the high-profile case of Maimonides (Mūsā ibn Maymūn [Arabic] or Moshe ben Maimon [Hebrew], 532-601/1138-1204):

It has been said that al-Ra'īs Mūsā had converted to Islam while in the Maghrib, memorized the Qur'an and studied Islamic jurisprudence. Then, when he went to Egypt and took up residence in Old Cairo, he reverted to his former faith. <sup>46</sup>

The author's tentative framing (»It has been said«, *wa-qīla*) seems pointed, especially in regard to someone closely connected to his own personal networks. The allegation that someone converted to Islam and then apostatized (*irtadda*) was a grave one, but in the case of Maimonides it may have been mitigated by being less than voluntary: unlike what was typical in other Islamically ruled realms, the Almohads, rulers where Maimonides had sojourned, left their subjects little choice. <sup>47</sup> Ibn Abī Uṣaybī'a has chosen to repeat the information, perhaps because it was well known and also mentioned by Ibn al-Qiftī, but he has diluted its significance as being merely a rumor.

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44 Ibn Abī Uṣaybī'a, *Uyūn al-anbā'*, ed. and trans. Savage-Smith *et al.*, sec. 11.3. On 'Alī ibn Rabban al-Ṭabarī and his father, see Thomas, Al-Ṭabarī.

45 Ibn Abī Uṣaybī'a, *Uyūn al-anbā'*, ed. and trans. Savage-Smith *et al.*, sec. 8.29.3. On Ibn al-Dāya, see Rosenthal, Ibn al-Dāya.

46 Ibn Abī Uṣaybī'a, *Uyūn al-anbā'*, ed. and trans. Savage-Smith *et al.*, sec. 14.39.2 and n. 7 and see (as noted there) Ibn al-Qiftī, *Ibn al-Qiftī's Ta'riḥ al-ḥukamā'*, ed. Müller and Lippert, 317; Stroumsa, *Maimonides*, 57-61. My gratitude also goes to Rachel Richman for the insights shared in her unpublished paper, »The biography of Maimonides: An inquiry into the biographical and autobiographical sources« (8 December 2017; *pers. comm.*, 26 January 2022).

47 Stroumsa, *Maimonides*, 56-58.

Unless Ibn Abi Uṣaybi'a is again simply echoing his sources, he explains Maimonides's Jewish affiliation as a »reversion« that came after the rumored conversion to Islam. It appears that, for him, Maimonides could not be Muslim and Jewish simultaneously; since he was Jewish in Egypt, he must have either reverted or never converted to Islam in the first place. The concept that religious affiliation was exclusive seems to have been generally accepted, but the case of Maimonides does raise the question of whether there might be exceptions that would allow one to infer multiple simultaneous affiliations. A historian from the region, 'Abd al-Wāḥid al-Marrākushī (581-625?/1185-1228?), who was a younger contemporary of Maimonides, comments:

Jews in our midst behave outwardly as Muslims: they pray in the mosques, they teach their sons the Qur'ān, they behave like our coreligionists and adhere to our tradition; but God alone knows what they hide in their hearts and what they do in their houses.<sup>48</sup>

Maimonides himself asserted that it was possible to live as a Jew, secretly observing the commandments, while superficially professing Islam:

If a man wishes to fulfill the 613 commandments secretly he can do so ... They know very well we do not mean what we say [the *shahāda*], and that what we say is only to escape the ruler's punishment and to satisfy him with this simple confession.<sup>49</sup>

Maimonides and his coreligionists might not have considered themselves to be Muslim in anything more than name. Yet when it is their social interactions in view rather than their secret observance of Torah, Jews who were forced to convert to Islam under the Almohads could be seen to have multiple affiliations. The case of Maimonides in the *History of Physicians* is a caution against inferring religious affiliations superficially; on a careful reading, the author's uncertainty regarding whether Maimonides was Jewish or Muslim in the Maghrib constitutes possible indicators for two affiliations, both of which should be considered in the analysis.<sup>50</sup>

#### *Labeling Religious Affiliation Based on Multiple Signals*

Explicit labels, religious occupations or offices, family relationships, and a handful of given names can all provide signals of a person's affiliation with varying degrees of certainty. Cumulatively, such signals may help to establish that a person is being portrayed with a certain affiliation, even if individual signals (such as names or relationships) are not decisive when taken in isolation. Moreover, multiple signals should be recorded even when they appear contradictory, since they may indicate the author's uncertainty or the subject's conversion or multiple affiliation.

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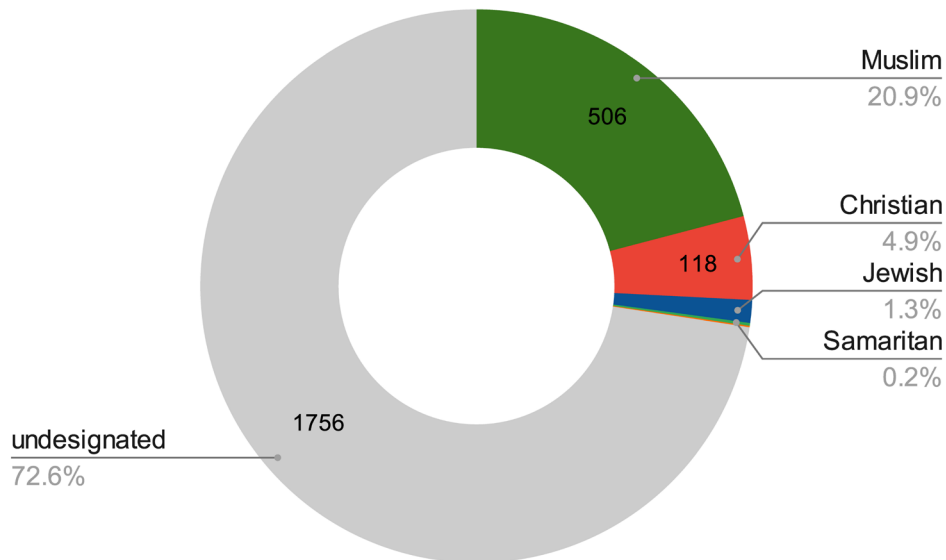
48 Translation from Stroumsa, *Maimonides*, 57-58. On al-Marrākushī, see Viguera Molins, 'Abd al-Wāḥid.

49 Maimonides, *Martyrdom*, sec. 4, trans. Halkin and Hartman, 30. The rest of this fascinating epistle is certainly relevant to the question of multiple affiliation but cannot be discussed here.

50 In the working definition of religious affiliation in the *History of Physicians* given above, note that the exclusivity of groups is only »typical«, allowing for some exceptions.

As a first trial, we used these indicators to label the affiliations of persons in the index of the recent edition and translation of the *History of Physicians* (LHOM).<sup>51</sup> These index entries normally provide the person's full name and a brief description and sometimes include the person's occupation, affiliation, or relationships, to the extent these may be useful for identification. For example, the entry for the abovementioned al-Ṭayfūrī is: »'Abd Allāh al-Ṭayfūrī, Christian physician to al-Hādī«. Often, this information is drawn from the text of Ibn Abī Uṣaybī'a, but occasionally it is supplemented from external sources.<sup>52</sup> Working with the index is thus only a preliminary way to probe what in a further stage could likely be derived from signals in the main text.

Overall, using these signals from the index entries, we were able to manually label the affiliation of approximately 660 persons out of 2,418 in the index, or about 27% (see *Figure 1*). While this is far from the proportion needed to draw statistical conclusions or make inferences from network topography, it is still far more than can be done by relying on explicit identifications alone. Further, it is hoped that these signals will allow us to label many more affiliations when working directly with the text rather than with the index.



*Figure 1: Total number of persons in the LHOM index whose affiliation could be labeled by any of the abovementioned signals.*

51 See the project report in this volume. Vanessa Birkhahn, Fabio Ioppolo, Nadine Löhr, Robin Schmahl, and Malinda Tolay (in alphabetical order) helped identify and proofread the information coming from the raw text of the index. Vanessa Birkhahn also helped to mark stated religious affiliations, and Fabio Ioppolo and Malinda Tolay processed the relationships mentioned in the index. As a rule, these entries can also be found in a draft form (with ongoing corrections) at usaybia.net.

52 Although the LHOM index does not specifically cite sources, the editors indicate in the English footnotes to the corresponding biographies in the text the primary and secondary sources they used.

As can be seen in Figure 2, the usefulness of each type of signal varies depending on the affiliation.<sup>53</sup> Muslims can be identified especially by their mentioned occupations or offices, by their given names, or by their ancestors' names. The same is largely true for Christians, but the latter are identified at a higher rate by the editors of the index, and their *nisab* are also helpful.<sup>54</sup> Finally, Jewish affiliations prove quite difficult to find.

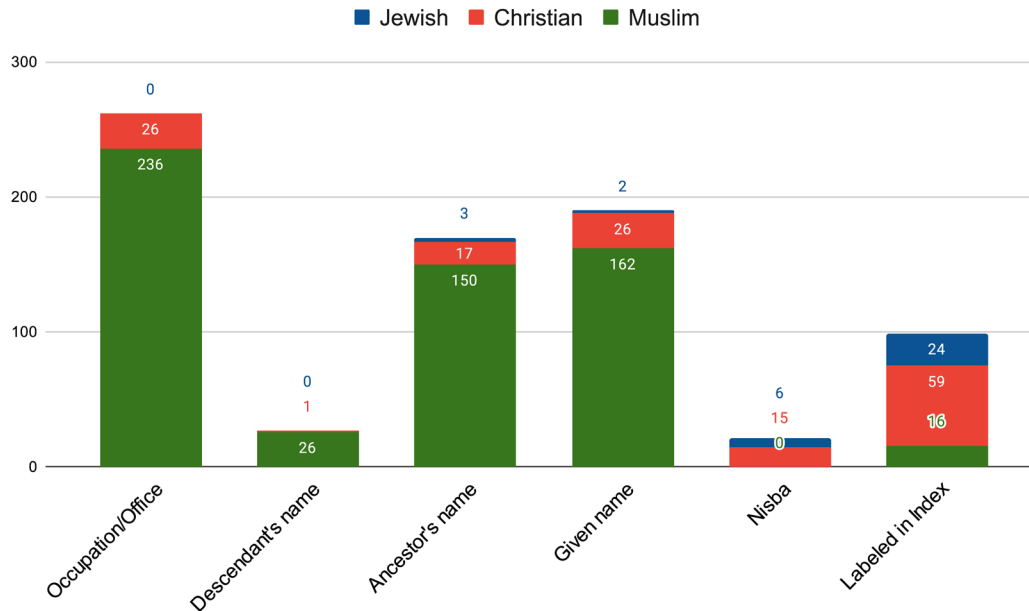


Figure 2: Number of persons from the LHOM index who could be labeled with Jewish, Christian, and Muslim affiliations, by signals used. The same person may be listed with more than one signal.

### Constructing a Labeling System

The above charts, which bracket each person in the text into a single macro-affiliation, might seem at first glance to have quantified Ibn Abi Uṣaybi'a's designations of religious affiliation. In reality, they have paved over the specificity and nuance of his affiliational portrayals and, moreover, ignore the uncertainty involved in interpreting them. What is needed is to be able to record each signal's direction, type, and certainty; that is, the specific or generic affiliation to which the indicator points, the evidence on which it is based (occupation, name, family relation, etc.), and how definite that indicator is in the author's portrayal. Multiple signals should be allowed for each person, and each of the signals' properties should be queryable by machine. In natural language, such a query might be expressed, or example, as »Show each person in the dataset having signals for a Jewish affiliation with a combined certainty of at least x« or »Show each person having signals for a Christian affiliation whose children have distinctively Muslim names«.

53 For this chart, narrow affiliations such as »Shi'i« or »Qaraite« are grouped with broader ones (»Muslim« or »Jewish«), and Samaritan and Zoroastrian affiliations (with 4 and 2 persons labeled, respectively) are omitted as having insufficient data.

54 The »Labeled in Index« column shows affiliations that the editors explicitly provide in the index and may come from indications in the text or outside information.



What this would enable is a kind of granularity that approximates the texture of Ibn Abī Uṣaybi'a's descriptions even when working with thousands of person records. Most notably, allowing multiple signals for each person, which can point even toward differing affiliations, will highlight cases that need further investigation. One of the signals may be inaccurate, conversion may have occurred (consecutive single affiliation), or it may be a case of simultaneous multiple affiliation. Converts, for example, might be particularly influential in cross-communal knowledge exchange networks by transmitting knowledge from their old community to the new one (and possibly in the reverse direction), so it is important to see both of their affiliations.

For this labeling system, a kind of database should be chosen that allows recording and querying person records using the abovementioned features of religious affiliation. This has mostly to do with how the data is structured but could also be affected by limitations of the underlying database application or code. In line with our project's adoption of TEI-XML for several other purposes – tagging person and place names in the Arabic edition of the text, creating person and place entries, and recording prosopographical factoids<sup>55</sup> – this is also the format that we find most compatible for recording religious affiliation signals. When loaded into an XML database, the various characteristics of these signals can be retrieved and processed using the XQuery language.

The example below shows one way a religious affiliation signal based on a person's occupation could be modeled using the state element in TEI, either within a person entry or incorporated into a factoid.<sup>56</sup>

```
<state
  type="signaled-religious-affiliation"
  subtype="signaled-by-occupation"
  ref="http://syriaca.org/keyword/coptic"
  ana="http://syriaca.org/keyword/priest"
  cert="high">
  <label>Coptic</label>
  <note type="desc">
    A Coptic affiliation is signaled by the person's
    occupation as a priest in a Coptic environment.
  </note>
</state>
```

Figure 3: Example of a religious affiliation signal encoded as a TEI state element.

55 Factoids are machine-readable statements of what we understand the text to be asserting about people, relationships, and events. See in this volume Gibson and Schmahl, *Communities of knowledge*, 205.

56 »(state) contains a description of some status or quality attributed to a person, place, or organization often at some specific time or for a specific date range« (TEI Consortium, TEI element state). The state element was chosen over the faith element because TEI defines the latter in a way that emphasizes personal religious beliefs, contrary to the considerations mentioned in the working definition of religious affiliation above (TEI Consortium, TEI element faith). A similar structure to the one shown here could also be used to tag the indication in the text edition itself.

The @type and @subtype attributes indicate that this is a religious affiliation signal derived from someone's stated occupation, enabling all religious affiliation signals to be selected or to filter for only those based on occupation. The @ref and @ana attributes point to terms in an external taxonomy for the community and the occupation, respectively.<sup>57</sup> Since the taxonomy connects these to a hierarchy of broader and narrower terms, inferences about these terms can be made by machine, such as that the »Coptic« religious affiliation is related to the broader term »Christian«. The certainty of the person encoding the signal, that is, how definitively the encoder considers the affiliation to be indicated, can be given in the @cert attribute, either as »high«, »medium«, or »low«, or as a numeric value between 0 and 1.<sup>58</sup> Multiple signals are recorded simply by adding another state element in the person record or adding another religious affiliation factoid. The label element shows a human-readable gloss to display for the signal, and the note element can provide more human-readable information about the inference being made. Finally, if an approximate date or date range of the affiliational signal is known, such as the date of someone's conversion, it can be indicated in the date attributes provided by TEI (not shown here). All of this is directly connected to the relevant person, either by appearing as one or more state elements inside the person record or, in the case of a factoid, by linking to the person's record in the database.

As mentioned above, being able to reflect the nuance and uncertainty of Ibn Abī Uṣaybi'a's hints about affiliation also requires dealing with multiple – and sometimes conflicting – indications, or »mixed signals«. In the LHOM index, there are fewer mixed signals than I expected, with only two persons having conflicting »macro-affiliations«. These are Abū Ghālib ibn Ṣafīyya al-Ṭabīb al-Naṣrānī (active late sixth/twelfth century), who is explicitly called a »Christian« but whose ancestor Ṣafīyya bears a name attested in Jewish usage in OA; and Abū Ja'far Yūsuf ibn Aḥmad ibn Ḥasdāy (d. 530 or 531/1136), who seems to have hailed from the Jewish Ḥasdāy family in Andalusia, but who is said in other sources to have been a Muslim.<sup>59</sup>

### *Named Entity Recognition*

Tagging a text with machine-readable labels raises the question of whether the tagging itself could be automated. Fundamentally, named entity recognition (NER) is just such a process. A digital text is passed into a process that categorizes each word using either predetermined rules or a model trained on previously tagged texts. Religious affiliation in a text such as the *History of Physicians* could, theoretically, be tagged this way – if the model being used can process Arabic texts and recognize religious affiliation terms.

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57 *A Taxonomy of Syriac Studies* (syriaca.org/taxonomy).

58 »The cert attribute provides a method of indicating the encoder's certainty concerning an intervention or interpretation represented by the markup« (TEI Consortium, TEI infrastructure, sec. 1.3.1.1.4 Sources, certainty, and responsibility). Theoretically, a numeric value for the certainty of implicit signals (e.g., names) could be calibrated on the basis of explicit ones (e.g., *nisab*), but only once a more fully labeled dataset is available.

59 See Sánchez, Ibn Ḥasdāy; Stroumsa, *Between acculturation and conversion*.

At present, there are several difficulties with using NER for this task. Most fundamentally, Arabic NER models do not currently include entity types for religious affiliation. This is at least partly because terms for religious affiliation are inadequately tagged, if at all, in the text corpora that have been used to train NER models. CANERCorpus is the most relevant text corpus for classical Arabic, with 258,264 words tagged from the hadith collection of al-Bukhārī.<sup>60</sup> Impressively, 20 different entity types are tagged, but there are only 210 words tagged with the types relevant for our purposes: organization (Org), sect (Sect), and religion (Rlig).<sup>61</sup> When training their BERT-BGRU-CRF model, Norah Alsaaran and Maha Alrabiah excluded these entity types as having insufficient data.<sup>62</sup> The ANERcorp tagged corpus of modern Arabic newspaper and Internet articles (125,102 words) generally labels the explicit religious affiliation terms »Muslim«, »Christian«, and »Jewish« as either other (O) or miscellaneous (Misc),<sup>63</sup> while the AQMAR corpus of Arabic Wikipedia articles additionally labels many of these as persons (PER).<sup>64</sup> The NER functionality in CAMELBERT is, moreover, based on ANERcorp, and the one in the popular Stanford NLP is based on AQMAR.<sup>65</sup> At base, then, to my knowledge, there exists no NER tool for tagging religious affiliation in Arabic because none have been trained on texts tagged suitably for this task. The text of Ibn Abī Uṣaybi'a tagged with religious affiliation signals could be used for such training.

Second, the conceptual work of defining what should be considered to indicate religious affiliation must be done prior to tagging a text and training NER models – and this is still lacking. What I have outlined above is merely a preliminary foray.

Finally, if we are to link the »religious affiliation« terms labeled by NER to stable identifiers for religious entities, far more work needs to be done on structured digital ontologies and taxonomies of religious affiliation. Whereas the requirements of libraries, personographies, and gazetteers have stimulated a prolonged wrestling with the conceptual framework for identifying persons and places (and, to a lesser extent, titles and subjects), the application of religious affiliation labels in databases or digital text editions has not received the same kind of attention.

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60 Alsaaran and Alrabiah, *Classical Arabic*, 91542; Salah and Binti Zakaria, *Building the Classical Arabic Named Entity Recognition Corpus*.

61 Alsaaran and Alrabiah, *Classical Arabic*, 91543.

62 Alsaaran and Alrabiah, *Classical Arabic*, 91543.

63 Benajiba *et al.*, *ANERsys*, 149; see also Obeid *et al.*, *CAMEL tools*. I accessed the dataset from [camel.abudhabi.nyu.edu/anercorp/](http://camel.abudhabi.nyu.edu/anercorp/) on 8 June 2023.

64 Mohit *et al.*, *Recall-oriented learning*, 162-163, describing the AQMAR corpus and tagger and its relation to other Arabic NER solutions; see also Alsaaran and Alrabiah, *Arabic named entity recognition*. I accessed the dataset from [www.cs.cmu.edu/~ark/ArabicNER/](http://www.cs.cmu.edu/~ark/ArabicNER/) on 8 June 2023.

65 Inoue *et al.*, *Interplay*, 5, and Stanford NLP Group, *NER models*, respectively. Regarding other NER services: Microsoft's Azure services explicitly states that it does not include nationality or religion in the »Organization« category (which is included for Arabic language) and does not appear to include it elsewhere (Jboback *et al.*, *Entity categories*). The popular spaCy toolkit does not list any official Arabic models, but some work appears to have been done in the »ar« folder of the GitHub repository (ExplosionAI GmbH, *Models & languages*).

### *Conclusions and Application*

When it comes to coding religious affiliation in Ibn Abī Uṣaybi'a's *History of Physicians*, the next step would be to manually label signals of religious affiliation throughout the text of chapters 8-15 and connect these to the people already identified and tagged.<sup>66</sup> Something similar to the example of the state element given above could be applied inline as a tag where such signals occur in the text, or as »standoff markup« in the form of a TEI factoid linking to the text passage. While some of the labeling can probably be done by searching for keywords (explicit designations, occupations, and names, as mentioned above), it will undoubtedly need thorough human review, and connecting these tagged signals to the people they refer to is most likely a manual task.

Comprehensively tagged religious affiliation signals will add a crucial analytic dimension to our analysis of the networks Ibn Abī Uṣaybi'a depicts in his text, which contain thousands of persons with perhaps tens of thousands of relationships between them. It will then be possible to see which persons »bridge« various religious communities or »clusters«, and to do so while taking into account the certainty and specificity of the signals. With this information in hand, anecdotal impressions can be compared to wider patterns. For example, are Ibn Abī Uṣaybi'a's own networks more interreligious than those he reports from other sources? An answer to this question would help test Thomas Carlson's thesis that medicine in the seventh/thirteenth century was less dominated by Muslim practitioners than previously suggested.<sup>67</sup> Or, as another example, among the various roles our author portrays (physician, patient, patron/employer, commentator, etc.), how is religious affiliation distributed?

Religious affiliations labeled in Ibn Abī Uṣaybi'a's text with the detailed attributes mentioned above could serve as training material for Arabic NER models, making it possible to tag religious affiliations in the voluminous pages of other medieval Arabic biographical works. While adjustments would need to be made for the idiosyncrasies of particular corpora, computer tagging of religious affiliations is a conceivable goal. So far, NER tools for Arabic do not label religion-related terms. The tagged text of Ibn Abī Uṣaybi'a could serve as ground truth, specifically as labeled training data, to train an algorithm using supervised or semi-supervised learning methods. That is, using a text tagged for religious affiliation signals in the ways described here, someone wanting to tag another text (or corpus) for religious affiliation could automate the process and further refine its accuracy. Such an algorithm should be trained to label religious affiliation with the type of signal, its corresponding certainty, and its referent (the specific or more general community to which it refers).

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66 Although general considerations for this work were discussed above, more specific guidelines for encoders need to be developed to ensure that this can be done consistently across the text.

67 Carlson, *Garden of the reasonable*.

Our understanding of interreligious exchanges in the medieval Near East has so far been hindered not only by vague definitions of religious affiliation and confusing disparities between medieval and modern concepts, but also by the lack of large-scale, systematically tagged data. Further study of the relationships between religious communities should have a broader textual basis, one assisted by automated tagging and analysis, but one that does not flatten religion into a single macro-affiliation attribute for each of the persons mentioned in these texts. As seen in Ibn Abī Uṣaybī'a's *History of Physicians*, affiliation can be broad or narrow, single or multiple, and based on evidence that is more or less definitive. Thus, the approach described here, applied at first manually, can serve as the starting point of larger-scale, machine-assisted analyses of interreligious relations.

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