

# Synopses and Lists

## Textual Practices in the Pre-Modern World

EDITED BY TERESA BERNHEIMER AND RONNY VOLLANDT



UNIVERSITY OF  
CAMBRIDGE

Faculty of Asian and Middle  
Eastern Studies



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Cover image: A fragment of a numbered and tabulated list of 22 biblical and rabbinic passages relating to the Sabbath, each referenced by means of a short lemma (T-S D1.76 from the Cambridge Genizah Collection). Courtesy of the Syndics of Cambridge University Library.

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# REGULARITY AND VARIATION IN ISLAMIC CHAINS OF TRANSMISSION<sup>1</sup>

*Maroussia Bednarkiewicz*

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One type of list in classical Arabic literature never ceases to attract considerable attention among scholars across a wide range of disciplines, from theology to legal studies, and from history to computer sciences. The list in question is called in Arabic an *isnād* (pl. *asānid*) and it records the names of each narrator, from one generation to the next, who narrated the narrative that follows the *isnād*. The narrative part—in Arabic, *matn* (pl. *mutūn*)—and the list—that is, the *isnād*—are the two constitutive elements of a *ḥadīth* (pl. *aḥādīth*), which can be translated in English by ‘account’, ‘report’, or ‘narrative’. The *ḥadīth* literature usually designates the collection of famous accounts that purportedly preserve the words and deeds of Islam’s prophet, Muḥammad, and his companions.

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<sup>1</sup> I would like to thank the organisers and participants of the workshop ‘Synopses and Lists’ for inspiring discussions, as well as Ali Zaherinezhad and Álvaro Tejero Cantero for their comments on this paper. The research presented here is part of my current project funded by the Deutsche Forschungsgemeinschaft under Germany’s Excellence Strategy (EXC number 2064/1, Project number 390727645).

The *isnād* or list of transmitters, also known as a chain of transmitters, traces the genealogy of the account to which it is attached and indicates its origins. It is mostly used as a tool to evaluate the authenticity of the narrative *matn*, and, as often happens with lists, *asānid* “are taken for granted and their content is seen as more interesting than the way in which they were put together.”<sup>2</sup> In the computational analysis of text, the contrary occurs: regular structures and forms, such as lists, are often considered first for their forms, which allow a large quantity of textual data to be divided into smaller units following formal rules. These small units can then be processed by algorithms one at a time, like pixels in an image or vectors in a matrix.

Many computer scientists thought that, given a finite list of all the transmission terms and a list of the main characteristics of Arabic proper names, simple algorithms should be able to automatically recognise the *isnād* as a regular sequence of names and transmission terms. Their successive attempts suggest that the problem was more complex than initially thought. At first glance, the *isnād* does seem like a fairly regular list of narrators’ names preceded by transmission terms, as shown in the following example, where the *isnād* runs until the asterisk and the transmission terms have been put in square brackets to mark the repetitive structure of the list: [transmission term(s)], proper name, [transmission term(s)], proper name, and so on.

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<sup>2</sup> Bray, ‘Lists and Memory’, 214.

[حدثنا] يحيى بن يحيى [قال أخبرنا] عبيد الله بن إياد [عن] إياد [عن] البراء  
[قال قال] رسول الله صلى الله عليه وسلم [\*] إذا سجدت فضع كفيك وارفع  
مرفقيك.

Yahyá ibn Yahyá narrated to us, he said ‘Ubayd Allāh ibn  
Iyād reported to us according to Iyād according to al-Barā’,  
he said the messenger of God may God bless him and grant  
him peace said [\*] When you prostrate (in your prayer),  
place your palms on the ground and raise your elbows.<sup>3</sup>

Attentive readers will notice irregular patterns, which raise various questions: Why are the patronyms mentioned in some names and not in others? Why do the transmission terms vary? Why do we twice have two transmission verbs, and at the beginning only one, and twice a preposition in the middle? What do these variations mean? Why did the narrators or the scribes use different terms of transmission?

The *isnād* has long been “taken for granted” as a tool for the authentication of *aḥādīth*, and it is perceived functionally as a regular collection of names. As a list, on the other hand, the *isnād* pertains to a much older and more versatile textual tradition. This versatility starts with the dual effect of all literary lists, underlined by Lennart Lehmhaus in his contribution to this volume: lists bring order in their content, but they interrupt the narrative form of the text in which they appear. They create a structure and break the overall structure. The *isnād* fulfils the common list function of “ordering knowledge” (Lehmhaus) by arranging

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<sup>3</sup> Muslim ibn al-Ḥajjāj, *Ṣaḥīḥ*, 251. All translations into English are my own.

the names in descending chronological order, starting from a student who received the account from his master who received it from his master and so on. This high concentration of names breaks the flow of the narration and disrupts the narrative structure.

But *asānid*, like many other lists, contain more information than names and transmission terms. Similar to the rabbinic lists, described by Lehmhaus, they participate in a discursive production of knowledge sourced in part from Muslims' cultural memory, as Herbert Berg has partially shown in a study about *isnād* in Qur'ān interpretations which we will introduce below. The producers and recipients of this knowledge are manifold: they are the students of a *ḥadīth* scholar who want to pass on their master's knowledge, the students of a legal scholar who seek righteous rulings to guide their life and their community, the exegetes who want to interpret the Qur'ān according to Muḥammad's teachings, the rulers in search of advice or religious supports regarding their reforms, the group of mystics trying to get closer to God; the enumeration can go on. The rich variety of producers and recipients influences the contents of the *isnād*, but what about its form? Are *asānid*'s forms as versatile as their content? And how does this versatility impact the computational analysis of *asānid*?

To better understand this variety of forms, I have adopted a twofold methodology, which consists in using a computer program to highlight the regularities and irregularities of *asānid* and then interpreting them in the broader context of lists in textual data, rather than specifically *asānid* in *aḥādīth*. A particular focus

will be laid on refining our definition of an *isnād* and gaining new insights on the forms and patterns of *asānid*. I will start with a lengthy review of the scholarship on lists, on *asānid*, and on the computational analysis of classical Arabic texts, which serve as the framework for my approach. I will then briefly introduce the texts I gathered for this study and the computer program I used, before I turn to the various forms of *isnād* observed throughout the corpus and their potential interpretations.

### 1.0. The Origins of the *Isnād*

At the beginning of the twentieth century, a small debate took place between two orientalist: Josef Horovitz argued that the *isnād* in its primitive form was taken from the Jewish literary tradition, from which he cites a couple of chains of transmission with three transmitters, including women.<sup>4</sup> Horovitz sees these examples as the source of inspiration for the Islamic *isnād* that was then further developed by Muslim scholars and also contains female transmitters. To this, Friedrich Schwally answered that the Jewish chains of transmitters never played the role they did for Muslims, whose Arab ancestors were in any case using such authoritative lists of names in their pre-Islamic literature.<sup>5</sup> The presence of *isnād* in ancient Arabic poetry, according to Schwally, suggests a much older and ‘foreign’ (*fremd*) origin of the *isnād*, by which he probably means neither Arabic nor Jewish.

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<sup>4</sup> Horovitz, ‘Alter und Ursprung des Isnād’.

<sup>5</sup> Nöldeke, *Die Sammlung des Qorāns*, 128–29.

Horovitz countered these three points, conceding that Jewish chains of transmitters, like Islamic ones, could come from an altogether older tradition, but while the source of inspiration for the Jewish chains is unknown, they were undoubtedly the source of inspiration for the primitive form of the *isnād*.<sup>6</sup> According to Horovitz, the *isnād* evolved from the Jewish examples and not from the pre-Islamic literature, since in that tradition it occurs only in poetry and was never transferred to Arabic prose; the latter, he seems to suggest, is closer to the *ḥadīth* literature, where most *asānid* are found.

This whole discussion relied on a few examples that appear anecdotal and therefore rather unconvincing.<sup>7</sup> A comprehensive study of *asānid*, even within a single collection to start with, would have been and remains a prerequisite for understanding *isnād* and speculating on its origins. Ideally, one should also consider lists of names as bearers of authority in general terms within oral societies at large, such as the examples found among Buddhists or Inuits. Until this research is undertaken, the putative foreign origin of the *isnād* will remain a hypothesis.

## 2.0. Dating the Muslims' Adoption of the *Isnād*

The date of origin of the *isnād*—that is, the time it was first introduced by Muslim scholars—has also triggered debates, which usually point to an account narrated by the early Muslim scholar

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<sup>6</sup> Horovitz, 'Noch einmal'.

<sup>7</sup> See the tentative criticism of Robson, 'Ibn Ishāq's Use of the *Isnād*'.



and famous interpreter of dreams, Ibn Sīrīn (d. 110/728).<sup>8</sup> The account is rarely quoted in the Arabic literature, which is astonishing when we think of the great interest that Arabs and Muslims at large dedicated to stories of origins, known in Arabic as *awā'il*.<sup>9</sup> Among the 2,582 authors present in the OpenITI corpus of Arabic literature, only 50 mention this *ḥadīth*.<sup>10</sup>

The version of the *ḥadīth* that is most often quoted comes from the introduction (in Arabic, *muqaddima*) to the *Ṣaḥīḥ* of Muslim ibn al-Ḥajjāj (d. 261/875).<sup>11</sup> This collection of *aḥādīth* was compiled in the first half of the third/mid-ninth century at the beginning of a great effort by *ḥadīth* scholars to prevent non-authentic *aḥādīth* from circulating. Collections of *aḥādīth* existed before then and concerns for authenticity were not new, yet Muslim ibn al-Ḥajjāj's *Ṣaḥīḥ* and the other so-called canonical *ḥadīth* collections mark a certain shift in *ḥadīth* sciences and Muslim cultural history, for these new collections eclipsed other collections and became the reference. Muslim ibn al-Ḥajjāj's 'Muqaddima' is an important writing to understand the context in which his *Ṣaḥīḥ* emerged. It is addressed to an unnamed person to whom Muslim justifies his methodology in the selection and dismissal of *aḥādīth*, and explains why he disagrees with other scholars or methods.

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<sup>8</sup> See Fahd, 'Ibn Sīrīn'.

<sup>9</sup> See Rosenthal, 'Awā'il'; Bernards, 'Awā'il'.

<sup>10</sup> Nigst et al., 'OpenITI'.

<sup>11</sup> Muslim ibn al-Ḥajjāj, *Ṣaḥīḥ*, 2–23. See the English text and commentary in Juynboll, 'Muslim's Introduction to His *Ṣaḥīḥ*'.

The *isnād* clearly occupies a preponderant place in the debate, which is concerned with the authenticity of *ḥadīth*. It is in this context that Muslim mentions Ibn Sīrīn's account about the introduction of the *isnād*:

حدثنا أبو جعفر محمد بن الصباح حدثنا إسماعيل بن زكريا عن عاصم  
الأحول عن بن سيرين قال لم يكونوا يسألون عن الإسناد فلما وقعت الفتنة  
قالوا سمو لنا رجالكم فينظر إلى أهل السنة فيؤخذ حديثهم وينظر إلى أهل  
البدع فلا يؤخذ حديثهم

Abū Ja'far Muḥammad ibn al-Ṣabāḥ narrated to us [that] Ismā'īl ibn Zakariyyā narrated to us according to 'Āṣam al-Aḥwal according to Ibn Sīrīn [who] said that they did not use to enquire about the *isnād*, and after the time of the *fitna* they said [to them]: "Name to us your men" then they examined the *ahl al-sunna* and they adopted their *ḥadīth* and they examined the *ahl al-bid'a* but did not adopt their *ḥadīth*.<sup>12</sup>

Before Muslim, it seems that only two scholars mentioned Ibn Sīrīn's account: Ibn Ḥanbal (d. 241/855), who cites it in his *ʿIlāl wa-l-maʿrifā*, and 'Abd Allāh al-Dārimī (d. ca. 255/869), who quotes a slightly different version in his *Sunan*.<sup>13</sup>

This *ḥadīth* has recently been the object of debates about the date of the *fitna*. The word *fitna* can mean 'tribulation', 'temptation', 'trial', or 'civil war' and it is often found with an adjective, as in the term 'the second *fitna*' to describe the upheavals around

<sup>12</sup> Muslim ibn al-Ḥajjāj, *Ṣaḥīḥ*, 9.

<sup>13</sup> Ibn Ḥanbal, *Al-ʿilāl wa-maʿarifah al-rijāl*, 2:559 (3640); al-Dārimī, *Musnad*, 396 (430). Al-Dārimī replaced *ahl al-sunna* and *ahl al-bid'a* with *ṣāḥib sunna* and 'those who are not *ṣāḥib sunna*'.

the death of the 'Umayyad caliph Mu'āwiya in 60/680 and the revolt of 'Abd Allāh ibn al-Zubayr (d. ca. 72–73/691–92). Without a complement, the word is ambiguous, for all its signifiers are used in Arabic sources to describe different events, troubles, and conflicts. Scholars seem to agree that the *fitna* to which Ibn Sirīn referred describes the aftermath of the assassination of an influential political figure, but they disagree on his identity: traditionally, it is interpreted as referring to the assassination of the third caliph 'Uthmān ibn 'Affān in 36/656; but Joseph Schacht argued for a much later date, affirming that it should be understood as the time following the assassination of Walīd ibn Yazīd in 126/744; while Gauthier Juynboll pushed it back to the time of Ibn 'Abd Allāh ibn al-Zubayr (d. ca. 72–73/691–92).<sup>14</sup> More recently, Pavel Pavlovitch examined Ibn Sirīn's report and its various versions and dated the birth of the *isnād* to the revolt of al-Mukhtār b. Abī 'Ubayd al-Thaqafī in 66–67/685–87 in Kufa.<sup>15</sup>

Interestingly, the idea that the *fitna* in this *ḥadīth* could refer to a period rather than an event, as suggested by Hawting and before him by Gardet, has not been investigated further, nor the possibility that Ibn Sirīn was not referring to the 'birth' of the *isnād* but rather to its use as an identity marker to distinguish between two different factions of Muslims.<sup>16</sup> Indeed, the verb used in the text suggests that people started enquiring (*yas'alūn* 'they asked, enquired') about the *isnād*, not that they introduced

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<sup>14</sup> Schacht, *Origins of Muhammadan Jurisprudence*, 71ff.; Juynboll, 'Date of the Great *Fitna*', 158–59.

<sup>15</sup> Pavlovitch, 'Origin of the *Isnād*'.

<sup>16</sup> Hawting, 'Significance of the Slogan', 453; Gardet, 'Fitna'.

it. It seems that despite all the ink that has been spilled, there are still pages to be written on this matter. Perhaps less pixel-like studies with more comprehensive scope, like the present one, will be a useful ground to give to this debate a new impulse.

### 3.0. *Isnād* and ‘Personal Connectedness’

Although Ibn Sirīn’s report might not be *stricto sensu* an *awā’il*, its topic, the use of the *isnād* as an identity marker, seems to pertain to this vast interest in origins and to the efforts to maintain strong ties with the past. Indeed, one of the *isnād*’s primary functions is to establish the origin of a report through personal connections between all those who reported it and transmitted it to the present. This function was examined by William Graham, who has argued that Muslims’ need for ‘personal connectedness’ to the past is characteristic of the Muslim tradition and expressed by the “*isnād* paradigm”:<sup>17</sup> in the *isnād* are preserved personal or individual connections up to Muḥammad or his companions and it is through this ‘human’ channel that knowledge is transferred, authority is derived, and truth is established.<sup>18</sup> In this sense, the *isnād* is both a tradition, *traditum tradendum*, “which is transmitted from the past to the present” and the ritual, the *actus tradendi*,

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<sup>17</sup> Graham, ‘Traditionalism in Islam’, 501.

<sup>18</sup> Graham, ‘Traditionalism in Islam’, 502 and 510–11. This need for personal connectedness is visible outside the *isnād* paradigm, for instance in the “discourse of place,” described by Zayde Antrim, *Routes and Realms*, 72, in which a Muslim geographer or historian described lands preferring “information mediated by earlier authorities over his own observations” even if the description was no longer accurate.

that is repeated to perpetuate the tradition.<sup>19</sup> As a ritual, it participates in the short-term communicative memory, and as a tradition, it shapes the long-lasting cultural memory.<sup>20</sup>

In his analysis of the cultural memory preserved in *asānid* related to Ibn ‘Abbās’s interpretation of the Qur’ān, Herbert Berg exemplifies how the *isnād* served to transfer the communicative memory of one generation to Muslim cultural memory at large. He does not consider, however, the role of Muslim cultural memory in the production of the *isnād* itself. Conflating Graham’s and Berg’s studies shows how *asānid* are successively and sometimes simultaneously the source, the product, and the vehicle of Muslim cultural memory. Through this triple function, the *isnād* has played an important role in the preservation of the chains of transmission after the canon.<sup>21</sup>

#### 4.0. The Spiritual Connection in *Asānid*

With each generation, the distance to Muḥammad grew, and thus *asānid* became longer, mirroring the increasing time span between the living generation and the sacred past. This distance was perceived as a progressive deterioration, expressed in a widely circulated *ḥadīth* where Muḥammad announced that the

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<sup>19</sup> Shils, *Tradition*, 11.

<sup>20</sup> See Assmann, *Das kulturelle Gedächtnis*, esp. 34, 52ff.; Assmann, *Religion and Cultural Memory*, esp. 3ff., 40ff.; Berg, ‘The Isnād’, 278. See also Berg’s discussion of the *isnād* as ritual (pp. 268ff.).

<sup>21</sup> See the recent investigation by Garrett Davidson about how Muslim scholars preserved the *isnād* which was “central to their ethos as a scholarly culture and community”; Davidson, *Carrying on the Tradition*, 9ff.

“best people are [those of] my generation, then [those of] the one which follows it, then [those of] the one which follows it.”<sup>22</sup>

To temper the inexorable decline of their generation’s quality, *ḥadīth* scholars deemed personal connectedness insufficient and they sought “the isnād with the fewest intermediaries” to establish closer connection through “elevation (*‘ulūw*).”<sup>23</sup> Eerik Dickinson explains how “[e]levation turned *ḥadīth* into a special kind of relic” which was recited orally for “spiritual self-improvement” and no longer for the transmission of knowledge, since this was guaranteed by the canon.<sup>24</sup> Although the *isnād* had lost its primary role as guardian of knowledge, it was reinterpreted as “a singular blessing which God had bestowed on Muslims” to distinguish them from other communities.<sup>25</sup> The “reconceptualization of the function of *ḥadīth* transmission” is further examined by Garrett Davidson, who shows how “imagining the chain of transmission in mystical terms infused it with further meanings”<sup>26</sup> and allowed *ḥadīth* scholars to save “this core element of their scholarly culture” from obsolescence.<sup>27</sup> The *isnād* not only changed function over time, it seems to have also played a different role outside the *ḥadīth* literature.

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<sup>22</sup> al-Bukhārī, *Ṣaḥīḥ*, III (*Kitāb al-Riqāq*):1305–6 (6504–5).

<sup>23</sup> Dickinson, ‘Ibn al-Ṣalāḥ al-Shahrazūrī’, 481.

<sup>24</sup> Dickinson, ‘Ibn al-Ṣalāḥ al-Shahrazūrī’, 504.

<sup>25</sup> Dickinson, ‘Ibn al-Ṣalāḥ al-Shahrazūrī’, 489.

<sup>26</sup> Davidson, *Carrying on the Tradition*, 31.

<sup>27</sup> Davidson, *Carrying on the Tradition*, 9.

### 5.0. Literary Emancipation without *Isnād*

In the *adab* literature concerned with love, Monica Balda-Tillier discovered that the *isnād* appears only in treatises where the author adopts a moralising tone, and is omitted in texts with lighter, more practical and sensible aims, where the authors share their own experience rather than the opinions of past authority. Balda-Tillier quotes a treatise about love by the Cordoban scholar Ibn Ḥazm (d. 456/1054) where the author cites few *asānīd* and shuns the well-known sayings of ancient Arabs, which have already been covered by others, because of his interest in new or contemporaneous forms of knowledge.<sup>28</sup> Thus some authors distinguished themselves and developed an identity of their own together with new forms of literary quotations. The cultural identity that Graham concluded was embedded in the *isnād* appears here negated, in that some authors turned away from the ‘personal connectedness’ to the past and created therewith new forms of identity. Although the present study will be restricted to the *ḥadīth* literature, Balda-Tillier’s reflection is a serious encouragement for further research on a broader corpus to map the *isnād* and all its diversity across Arabic literature. To this end, computational tools, in particular the most advanced machine learning algorithms, will be great allies.

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<sup>28</sup> Balda-Tillier, ‘La prose amoureuse’, 191.

## 6.0. Machine Learning and Text Analysis

In traditional programming, humans give to the algorithm input data and explicit rules, then the algorithm analyses the data according to the rules and outputs answers. An example of such a typical rule-based system is the algorithm that counts how many times a given word appears in a text or a simple search and replace. Often, however, we are unable to formalise representative rules. For example, if we want to count every time the prophet Muḥammad appears in a corpus, we need to account for all the different names and pronouns used to refer to him and distinguish them from the same names and pronouns used to refer to others with the same name. It would be difficult to distil rules for a machine to perform this task accurately because there are too many possibilities, similarities, and contexts. And if we want to analyse all the topics which are associated with the prophet Muḥammad in a *ḥadīth* corpus, it would require the crafting of very complex rules, to account for the variability, richness, and ambiguity of the textual expressions that qualify as a topic.

Such recognition and classification problems are the battlefields of machine learning algorithms, which do not receive rules, in contrast to traditional programming, but generate them. The machine learning algorithms ‘learn’ from the input data and output candidate rules to solve a given task, for instance finding when a pronoun refers to the prophet Muḥammad or clustering *ḥadīth* narratives according to prominent topics. Machine learning is not limited to textual inputs: given images of manuscripts together with their digital transcription, algorithms can learn how groups of pixels map to letters, for instance. After some



training, they are able to automatically transcribe previously unseen manuscripts, and with more training examples, they become strikingly accurate.

Four steps are required to solve problems with machine learning: (1) problem definition; (2) data preparation; (3) algorithm selection and training; and (4) performance evaluation and results interpretation. All four steps benefit from interaction between domain specialists and computer scientists. For automated *isnād* detection, one would need to first define what qualifies as an *isnād*. Then a digitised corpus should be built that is both representative and balanced. Depending on the problem definition and the corpus, a set of algorithms would be selected and trained; the selection of the data and the algorithms would influence both the quality of the results and the expense of the training. Finally, the trained algorithm could be applied to unseen texts in order to automatically highlight all the *asānid*. The results would have to be assessed critically in view of the expectations and in order to improve the choices that were made.

Before I turn to the problem of *isnād* detection, I will introduce two recent studies by Lange et al. and Alkaoud et al. which have shaped my approach to this task and exemplify the fruitful complementarity between Islamic studies and computer sciences.

## 7.0. Machine Learning for Islamic Legal Texts

In ‘Text Mining Islamic Law’, Lange et al. explore this complementarity and highlight how the combination of different computational analyses can confirm or correct previous conventional

studies based on smaller data sets and extrapolation.<sup>29</sup> They computationally analyse “a representative corpus of Islamic substantive law treatises (*furū‘ al-fiqh*) from the beginnings of Islamic jurisprudence in the 2nd/8th and 3rd/9th centuries to the 13th/19th century,” comprising 55 unique titles spread homogeneously across time and Islamic legal schools.<sup>30</sup> This choice introduces of course a level of subjectivity, yet the analysed corpus contains far more than any corpora used so far for traditional text analysis. In this sense, it constitutes a different bias from those present in previous studies and therefore brings new perspectives along with the confirmation of existing conclusions.

In particular, the authors examine the use of the Qur’ān, the ‘Qur’ān footprint’, and the most prominent verses, Islamic legal deontology, and the dominant topics in their corpus, applying different computational methods.<sup>31</sup> They are able to correct past assumptions regarding the reliance on the Qur’ān by some legal schools and quantify how much each work relied on which verses. They also show different positions and their evolution regarding the permissible and the forbidden and exemplify how prayer and property dominate the concerns of the authors selected for their study. These results are encouraging; they bring into Islamic studies different bases, notably quantitative data, to better situate and understand single texts within a larger corpus.

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<sup>29</sup> See the conclusion in Lange et al., ‘Text Mining Islamic Law’, 275–78.

<sup>30</sup> See Lange et al., ‘Text Mining Islamic Law’, 239ff., 278ff., for a detailed description of the corpus.

<sup>31</sup> Lange et al., ‘Text Mining Islamic Law’, 245ff. and 246n35.

Last but not least, this study highlights three crucial measures that should always guide any scholars working in digital Islamic studies (or digital humanities in general). First, the reproducibility of the results: all the texts, tools, and instructions used in any study must be rendered available for scholars to further test the conclusions drawn from the output data, for this is the *sine qua non* criterion of valid scientific analysis. Second, the corpus of texts ought to be curated by specialists who can guarantee its representativeness and its accuracy vis-à-vis the manuscripts. And finally, more tools, notably tools to detect text reuse, should be tested, in order to extract further information from the corpus, such as the *ḥadīth* ‘footprint’, for instance.<sup>32</sup> The present study adopted these measures as guidelines to shape its approach and the goals it should achieve.

### 8.0. Machine Learning for *Ḥadīth* Texts

While the *ḥadīth* footprint has not yet been explored, a large *ḥadīth* corpus of prophetic *aḥādīth*—that is, those that contain only reports about the prophet Muḥammad—has been the object of two recent studies using computational analyses. In ‘Verifying Source Citations in the Hadith Literature’, Syed et al. deploy statistical methods to find different kinds of errors in the *asānīd* of their corpus. Contrary to Lange et al., their initial corpus is annotated; that is, all the different parts of the *ḥadīth* are marked distinctively, as are the names of the transmitters in the *asānīd*, which are associated with biographical information. This allowed

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<sup>32</sup> Lange et al., ‘Text Mining Islamic Law’, 277.

them to use simple rule-based algorithms to detect when errors had been introduced in an *isnād*, whether by a transmitter, a scribe, a copyist, or an editor, and to correct them automatically. In doing so they curated their corpus and improved its quality to enable more accurate analysis of its content in the future.

The same corpus was used in ‘Learning to Identify Narrators in Classical Arabic Texts’, where Alkaoud and Syed trained machine learning algorithms (BERT models and Transformers) to automate the recognition of *asānid*. They parsed 1,400 works and were able to mark all the transmitters across the largest corpus ever analysed in *ḥadīth* studies. Thus they open the possibility to further investigate all the *asānid* of their corpus, and with a little more effort, the *mutūn* attached to them, which remain to be extracted.

All the algorithms used by Lange et al. can also be applied to other corpora, and the outcomes of this automated analysis of prophetic *aḥādīth* should in turn stimulate further exploration of the *ḥadīth* footprint in the legal corpus of Lange et al. These seminal works in digital Islamic legal and *ḥadīth* studies open the door to answering questions about the most prominent and the rarest *ḥadīth* transmitters, their favourite topics, their idiosyncrasies in terms of language and vocabulary, their relations with each other, the networks of knowledge they form, and so on.

The standards established by these interdisciplinary teams of scholars serve as a framework for the present study, which follows in their footsteps and expands on an area they have left untouched. The corpus on which the studies for this paper were conducted encompasses texts that have not yet been scrutinised,

namely prophetic and non-prophetic, legal and non-legal *aḥādīth*. The digital framework adopted here will serve to analyse the forms of *asānīd* and substantiate or revise the conclusions of previous historical studies, which have been concerned mainly with the origins and functions of the *isnād*, as will be shown next.

### 9.0. A Subcorpus for a Limited Scope

For this study to fit in the scope of the present paper, it was limited to a selection from a large *ḥadīth* corpus (which contains more than two thousand volumes) and to the annotation of the *asānīd* within this subcorpus. The texts were taken from works attributed to students of Mālik ibn Anas (d. 179/795), a famous jurist from Medina, whose teachings have purportedly been collected by his students and gathered in one of the earliest collections of thematically arranged *aḥādīth*, called the *Muwaṭṭaʾ* (in English, the ‘well-trodden path’) or spread across the students’ personal *ḥadīth* collections. These students were ‘Alī ibn Ziyād al-Ṭarābulī (d. 183/799), ‘Abd Allāh ibn Wahb al-Qurashī (d. 197/813), Muḥammad ibn al-Ḥasan al-Shaybānī (d. ca. 187/803), Yaḥyá ibn Yaḥyá al-Laythī (d. 234/848), and ‘Abd al-Razzāq al-Sanʿānī (d. 211/827).<sup>33</sup> Apart from ‘Abd al-Razzāq, each student is associated with a recension of the famous *Muwaṭṭaʾ*, which in the cases of Ibn Wahb and al-Shaybānī seems to be more a per-

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<sup>33</sup> Mālik ibn Anas, *Muwaṭṭaʾ* *riwāya al-Shaybānī*; Mālik ibn Anas, *Muwaṭṭaʾ* *riwāya Ibn Ziyād*; Mālik ibn Anas, *Muwaṭṭaʾ* *riwāya Yaḥyá al-Laythī*; Ibn Wahb, *Muwaṭṭaʾ*; ‘Abd Al-Razzāq, *Al-Muṣannaf*.

sonal collection than an unfaithful recension of Mālik's teaching.<sup>34</sup> As for 'Abd al-Razzāq's collection, his *Muṣannaf* ('sorted'; a name usually given to a collection of traditions sorted by topic) contains mainly materials from 'Abd al-Razzāq's Yemeni master, Ma'mar ibn Rāshid (d.153/770), yet it includes *aḥādīth* from Mālik as well.

This subcorpus covers a constrained time span to guarantee a certain degree of relation between the alleged collectors of the accounts, despite the geographically diverse area, spreading from Andalusia, Libya, Tunisia, Egypt, and Yemen, all the way to Iraq and Syria. Most of these texts were likely written down by students of the scholars mentioned above. The *asānid* often start with the name of Mālik's student rather than Mālik directly, which seems to indicate that many of Mālik's accounts did not reach the scribe directly, but only through at least one intermediary transmitter. Nevertheless, the texts still belong to a limited period, that is, one or two generations after Mālik. The patterns and idiosyncrasies found among the *asānid* of this subcorpus serve to examine the traces that Mālik in general or his students and their scribes in particular left in their common or diverging uses of *isnād*.

### 10.0. *Isnād* Annotation

Patterns are difficult for humans to detect in large quantities of textual data. A computer program was therefore used to mark the *asānid* semi-manually with the help of recommenders, which

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<sup>34</sup> See Ibn Wahb, *Leben und Werk*, 16, 43.

learn each time an *isnād* is marked and can then automatically recommend the next *asānid* to be marked.<sup>35</sup> The recommendations are manually validated or corrected, and the recommenders, which are partially based on machine learning algorithms, learn further and so improve their performance. This process is called ‘annotation’, as the texts are annotated prior to being analysed computationally.

Two different recommenders were used for the annotation: the String Matcher and the Multi-Token Sequence Classifier. The String Matcher finds exact matches: every time a new *isnād* is marked, the String Matcher registers it and automatically marks all the *asānid* which are identical. It gives a first impression of the most frequent *asānid* within a collection or across collections. It is also useful for reflecting on potential editing systems, whereby a certain type of *isnād* is systematically added to a *matn* for reasons yet to be discovered. The Multi-Token Sequence Classifier, on the other hand, automatically suggests fuzzy matches, which are *asānid* displaying a similar structure or sequence of words but with slightly different words or word orders. This recommender finds patterns in the form of the *isnād* and is particularly useful for identifying overall types of *isnād* according to their forms.

The two recommenders not only accelerate considerably the process of annotation, but also highlight overarching regularities and irregularities among *asānid* which have not previously been examined.

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<sup>35</sup> The program is called INCEpTION. See Klie et al., ‘The INCEpTION Platform’; for the recommenders in particular, see p. 7.

### 11.0. Delineating the Contours of the *Isnād*

When the recommenders' suggestions are accurate, there is often a pattern present. Three main categories of *asānīd* were found as a result in the annotated corpus: (1) the *mu'an'an isnād*, which is a list of names introduced by the preposition 'an (according to) and which contains no verbs; (2) the non-*mu'an'an* or verbal *isnād*, which is a full sentence with verbs and without prepositions; and (3) the mixed *isnād*, with verbs and the preposition 'an, this latter usually introducing the final names of the *isnād*.

The following example illustrates the two first types of *isnād*, the *mu'an'an* and the non-*mu'an'an isnād*.

مالك [عن] أبي نعيم وهب بن كيسان [أنه] سمع جابر بن عبد الله الأنصاري  
يقول رأيت أبا بكر الصديق أكل لحماً ثم صلى ولم يتوضأ

Mālik according to Wahb ibn Kīsān that he heard Jābir ibn 'Abd Allāh al-Anṣārī say: I saw Abū Bakr al-Ṣiddīq eat meat, then he prayed and he had not performed the ablution.<sup>36</sup>

In this *ḥadīth*, extracted from Yaḥyá al-Laythī's recension of the *Muwatta'*, the scribe distinguishes the *isnād* and the *matn* with the particle *an* (*annah* "that he"), the *mu'an'an isnād* documents the transmission path, and the narrative part starts with the narration of Wahb ibn Kīsān. In this version, Jābir belongs to the *matn*: he is thus a protagonist of the narrative not a transmitter.

The same *ḥadīth* is found in the recension of al-Shaybānī with a verbal *isnād*, in which the verbs of transmission appear between square brackets:

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<sup>36</sup> Mālik ibn Anas, *Muwatta' riwāya Yaḥyá al-Laythī*, 2:34.



[أخبرنا] مالك [حدثنا] وهب بن كيسان [قال سمعت] جابر بن عبد الله  
[يقول] رأيت أبا بكر الصديق أكل لحماً ثم صلى ولم يتوضأ

Mālik reported to us, Wahb ibn Kīsān narrated to us, he said: I heard Jābir ibn ‘Abd Allāh say: I saw Abū Bakr al-Siddīq eat meat, then he prayed and he had not performed the ablution.<sup>37</sup>

In al-Shaybānī’s version, each of the three transmitters is preceded by one or two different verbs. Do each of these verbs indicate a different mode of transmission? If so, are there degrees of authority attached to each mode? Where does the *isnād* end and the *matn* start? Does the *matn* start with the first verb in the first person singular (*sama‘t* ‘I heard’), or the second one in the reported speech of Jābir (*ra’ayt* ‘I saw’)? Al-Laythī’s *isnād* contains potentially less information but it gains in clarity by avoiding noise with all the different terminology, which does not seem to have been universally recognised and adopted. It also cannot be excluded that al-Shaybānī’s *isnād* was deliberately enhanced with verbs to temper the caesura introduced by the list of names and to give it a more narrative character, either for the scribe’s personal stylistic reason or because of regional and cultural writing traditions. The *mu‘an‘an isnād*, on the other hand, because of its simplicity and its regularity, might be easier to remember, since the memory can focus on the names, and simply separate them with the same preposition. Finally, the *mu‘an‘an isnād* breaks with the text to which it is attached (*matn*) and forms a distinct

<sup>37</sup> Mālik ibn Anas, *Muwatta’ riwāya al-Shaybānī*, 38.

unit, similar to the hypertext described by Wallraff in this volume. It is usually not introduced by a verb except for rare exceptions, and it starts abruptly with the proper name of the first transmitter. Its unique link to the *matn* is through a particle that implies the missing verb and renders its absence more visible, as the literal translation underlines.

Since it contains only proper names separated by prepositions, the *muʿanʿan isnād* can be described as a list of transmitter names, and so might be associated with the broader genre of lists. This opens new perspectives to understand the effect, function, and purpose of this type of *isnād*. Julia Bray noticed that Muḥammad ibn Ḥabīb (d. 245/860) used lists in his *Muḥabbar* “to throw up a new order of data, relational as opposed to narrative or declarative.”<sup>38</sup> This is the impression given by the *muʿanʿan isnād* and the metaphoric English translation ‘chain of transmitters’: each transmitter is a shackle attached to the next with the link of the preposition ‘*an*, all forming a chain that is related (relational) but not fused with the narrative. Like many other lists, the *muʿanʿan isnād* has “proven a highly efficient and effective device by which to reduce noise in the communication channel.”<sup>39</sup> Indeed, this *isnād* only contains one type of information: the names of the transmitters who partook in the transmission. It does not inform the reader whether the transmission occurred orally or in writing, in a group (*akhbaranā* ‘he reported to us’) or in private (*akhbaranī* ‘he reported to me’). When reading al-Laythī’s *ḥadīth*,

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<sup>38</sup> Bray, ‘Lists and Memory’, 222.

<sup>39</sup> Young, ‘On Lists and Networks’, 1.

the reader's attention is directed first to the names and then to the narrative, whereas in al-Shaybānī's version, the attention is dispersed since all the pieces of information are merged in one sentence.

In al-Laythī's *Muwattaʿ*, the *muʿanʿan isnād* is the most frequent type, and it is attached to reports mainly from Mālik and often with more than two transmitters in the *isnād*. It almost never includes al-Laythī's name, unlike the non-*muʿanʿan isnād*. There are three types of non-*muʿanʿan* or verbal *isnād* in al-Laythī's *Muwattaʿ*. First, there are those with a structure like *qāl<sup>a</sup> Yaḥyá qāl<sup>a</sup> Mālik* 'Yaḥyá said [that] Mālik said', which represents a third of the *asānid*. Second, there are ones that begin with something like *suʿil<sup>a</sup> Mālik* 'Mālik was asked'. Finally, some non-*muʿanʿan asānid* in this text use *Mālik annah<sup>u</sup> balaghah<sup>u</sup>* 'Mālik [said?] that it reached him'.

Each different type of *isnād* seems to systematically correspond with one particular type of transmission path. This suggests that the scribe was writing the *asānid* following some rules. With different *asānid*, he differentiated the reports coming from Mālik and those coming from Yaḥyá for example, or those where Mālik answers a direct question and those in which he narrates an indirect account. This implies that the *isnād* starting with 'Mālik' could have been reported by Yaḥyá al-Laythī, while those starting with 'Yaḥyá' come from his student.

There is one more indication in the *asānid* of this text that the scribe was probably copying from different notes taken at different times, potentially by various people. Towards the end

of the text, one of the recommenders, the Multi-Token Sequence Classifier, made a mistake in the marking of the following *isnād*:

مالك عن أبي الرجال محمد بن عبد الرحمن بن حارثة بن النعمان [\*]  
 الأنصاري ثم من بني النجار عن أمه عمرة بنت عبد الرحمن أن رجلين استبا  
 في زمن عمر بن الخطاب فقال أحدهما....

Mālik according to Abī al-Rijāl Muḥammad ibn ‘Abd al-Raḥman ibn Ḥāritha ibn al-Nu‘mān [\*] al-Anṣārī then from the Banī al-Najār according to his mother ‘Amrah bint ‘Abd al-Raḥman *that* two men quarrelled at the time of ‘Umar ibn al-Khaṭṭāb and one of them said....<sup>40</sup>

The recommender suggested the text up to the asterisk as an *isnād* with 95% accuracy and ignored the text from that point to the end of the extract. Twice before in the text, there had been an *isnād* with the same transmitters, except that the information in his name about his origins—the *nisba*—was not given: “Mālik according to Abī al-Rijāl Muḥammad ibn ‘Abd al-Raḥman ibn Ḥāritha according to his mother ‘Amrah bint ‘Abd al-Raḥman.” The recommender’s error seems therefore to have been induced by the indication of his origin, the *nisba*.<sup>41</sup> An explanation about a change of *nisba* had occurred only once before this *isnād* and only in the *matn*, in the case of ‘Abd Allāh ibn Zayd al-Anṣārī who is said to have acquired his *nisba* from the tribe of al-Ḥārith ibn al-Khazraj. Otherwise, the expression *min banī* ‘from the sons/

<sup>40</sup> Mālik ibn Anas, *Muwaṭṭa’ riwāya Yaḥyā al-Laythī*, 2:1211.

<sup>41</sup> The *nisba* is a part of an Arabic name that indicates the origin of the person, often in the form of an adjective. In this case, both *al-anṣārī* and *min banī najār* ‘from the tribe of Najār’ are *nisba*.

tribe of' is exclusively used to specify the origin of an undefined transmitter: "a man from the tribe of... said..." or "two men from the tribe of... asked the Prophet..." The text where the error occurred was therefore the first time that this specific expression appeared within an *isnād*, which explains why the recommenders did not recognise it as part of the transmission chain. The recommenders are sensitive to variations, and the more regular a text is, the more sensitive the recommenders become. This simple error from the recommender underlines therefore the high level of regularity in this collection and also the possible use of different notes or notes from different times in the composition of the final manuscript, leading to Muḥammad ibn 'Abd al-Raḥman ibn Hāritha being mentioned twice with his old name and once with his new *nisba*.

Another sign of this collection's regularity is the systematic absence of verbs of transmission, such as *akhbaranā* or *ḥaddathanā*. This led Nabia Abbott to conclude, when she analysed papyri with a section attributed to this recension of the *Muwaṭṭa'*, that "[i]n the earliest stages of the development of the *isnād*... the use of 'an... was generally accepted as equivalent to *ḥaddathanī*... and *akhbaranī*."<sup>42</sup> Whether she meant that the preposition and the verbs had the same degree of authority or that transmitters used the preposition and the verbs interchangeably is difficult to say. In any case, the previous observations made here indicate that the prepositions and the verbs might not have been

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<sup>42</sup> Abbott, *Qur'anic Commentary and Tradition*, 121.

deemed equivalent. The absence of transmission verbs in al-Laythī's *Muwaṭṭa'* might actually indicate an indirect transmission through notes that al-Laythī's student gathered from his own sessions with al-Laythī and from al-Laythī's notes, which came from Mālik directly or more likely indirectly, considering the large time gap between the two scholars.<sup>43</sup> The clear distinctions between the four types of *asānid* in this text, together with their regularity, suggest that its scribe applied certain rules to classify the information he was transmitting according to its origin or source.

In 'Abd al-Razzāq's *Muṣannaf*, the vast majority of *asānid* are also *mu'an'an* (about 80 percent), in the form of "Abd al-Razzāq according to... according to..." which is similar to al-Laythī's *mu'an'an isnād*, starting directly with a name without any introductory verb or preposition. The mention of 'Abd al-Razzāq's name indicates again that his student was most probably writing these accounts—or perhaps it involved several students, given the size of the collection (about 21,033 narratives compared to approximately 3,676 in al-Laythī's *Muwaṭṭa'*). Despite the overall regularity in the form of the *asānid*, 'Abd al-Razzāq's *Muṣannaf* displays some irregularities; these cannot necessarily be attributed to the involvement of different people or sources, because, even if there was only a single scribe involved, homogeneity would be almost impossible to achieve in such a large quantity of text, which must have been transmitted over a

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<sup>43</sup> Ahmed El Shamsy, 'The Ur-Muwaṭṭa'', 29, has recently argued that Mālik's students had access to "shared written source" from Mālik himself.

long period of time. There are also *asānid* of another type in ‘Abd al-Razzāq’s *Muṣannaf*, a mix of *mu‘an‘an* and non-*mu‘an‘an* (type (3) above), which systematically start with *akhbaranā* ‘Abd al-Razzāq... *akhbaranā*... ‘an... ‘an.... The two types of *asānid* often appear in clusters, and they are not intertwined indiscriminately: rather, they seem to form small subunits in the whole collection. More advanced machine learning algorithms will be able to analyse the topics and vocabulary associated with each different type and perhaps confirm our hypothesis that *aḥādīth* are here clustered by types as well as by topics.

By contrast, in al-Shaybānī’s recension, most *asānid* are mixed. Ninety percent of the *asānid* start with *akhbaranā Mālik* ‘Mālik narrated to us’, and they mostly continue with another *akhbaranā* or *ḥaddathanā* followed by the preposition ‘an, similar to the second, minoritarian type of *isnād* found in ‘Abd al-Razzāq’s *Muṣannaf*. We also find verbal *asānid* with *akhbaranā Mālik akhbaranā/ḥaddathanā... qāla...*, but there is not a single *mu‘an‘an isnād*; the preposition ‘an appears only to introduce the last or the two last transmitters of a mixed *isnād*. The scribe also distinguishes between the accounts of Mālik, introduced with *akhbaranā Mālik*, and the related comments by Muḥammad al-Shaybānī, which are preceded by *qāl<sup>a</sup> Muḥammad*. There is again a visible system of information classification according to their sources, even though in this case it is slightly less elaborated and rigorous, since it introduces a simple binary distinction (as op-

posed to the four subtypes found in al-Laythī) and uses two different verbs, *akhbaranā* and *ḥaddathanā*, for a seemingly identical meaning.<sup>44</sup>

The small collection of Ibn Ziyād (159 narratives) contains mainly two types of *isnād*, *muʿanʿan* and verbal *asānid*, almost always with the name of Mālik either introduced by the verbs *qāl<sup>a</sup>* or *saʿal<sup>a</sup>* (around 65 percent of examples), or preceded by the preposition *ʿan* (around 27 percent). The *asānid* are short and they often link two names only. A few mixed *asānid* break the regularity with strange combinations, such as *akhbaranā ʿan Mālik* or *qāl<sup>a</sup> ʿan Mālik*, but all in all, there is a recognisable organisation. It seems that Ibn Ziyād, who must be the transmitter and potentially the scribe, since his name is never mentioned, gathered in this collection mostly Mālik's sayings, teachings, and opinions together with some ancient narratives from the time of Muḥammad. Although the *asānid* reflect his own selection, their close resemblance to al-Laythī's short *asānid* suggests a potential style coming from Mālik's lectures or notes.

Finally, the least organised collections are those of ʿAbd Allāh ibn Wahb. In his *Muwaṭṭaʿ*, mixed *asānid* dominate. They start with an introductory verb similar to the ones found in al-Shaybānī's *Muwaṭṭaʿ*, yet the pronoun attached to the verb is not the first person plural *-nā*, but the first person singular *-nī*: *akhbaranī* and *ḥaddathanī*. These forms are uncommon in the other collections analysed here: while these forms are present in

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<sup>44</sup> The third/ninth-century Egyptian scholar Abū Jaʿfar al-Ṭaḥāwī wrote a treatise arguing that the two verbs were identical in meaning, contrary to the assertions of other scholars; al-Ṭaḥāwī, *Al-Taswīya*.



al-Shaybānī's (6.6%) and 'Abd al-Razzāq's collections (12%) in very small quantities, in al-Laythī's they only appear in the *matn*, never in the *isnād*. Thus Ibn Wahb distinguishes himself with the use of this first person singular pronoun in mixed *asānid*, regular in their form and content, for *akhbaranī* and *ḥaddathanī* are systematically followed by the preposition 'an. Another distinguishing element in Ibn Wahb's collection is the absence of a short verbal *isnād* to introduce the teaching and opinions of Mālik.

## 12.0. Separating Transmission from Narration

There is one common element across the collections which marks the transition from the *isnād* to the *matn*: the particle *an* (أَنْ). This particle does not appear in the *isnād*, except for some rare exceptions which are likely mistakes, and seems to be used to distinguish between transmission and narration. This distinction is particularly clear in the list form of the *mu'an'an isnād* that stands out from the *matn* visually, acoustically, and semantically. By contrast, the verbal *isnād* is merged with the *matn* and suggests a more direct relation between the narrative and its transmitters. This form of *isnād* is often found to render Mālik's teachings and opinions in the form of *qāl<sup>a</sup> Mālik* 'Mālik said' or *su'il<sup>a</sup> Mālik 'an* 'Mālik was asked about'. It then contains one or two names (Mālik and Yaḥyá, for instance) and seems to indicate a more straightforward mode of knowledge transmission from master to student, contrary to the convoluted transmission from Muḥammad's time all the way up to the last transmitter, which represents four to five generations for the texts analysed in this paper. A compromise is reached in the mixed *isnād*, which usually starts

with a verb and ends with the preposition *‘an* and thus retains part of the differentiating effect produced by the *mu‘an‘an isnād*, but adds a narrative character which tones down the clear-cut distinction between transmission and narration.

With time, the mixed *isnād* gained in popularity, and further annotation of later *ḥadīth* collections is necessary to help us understand why the simpler form of the *mu‘an‘an isnād* was not retained. When Muslim ibn al-Ḥajjāj wrote his ‘Muqaddima’, the introduction to his great work, the *Ṣaḥīḥ*, he dedicated a long section to countering the criticism addressed against the *mu‘an‘an isnād*. The *mu‘an‘an isnād* was being targeted for its lack of clarity regarding the modes of transmission that it represented, compared to an expression such as “*sami‘tu aw akhbarani*” (‘I heard or he reported to me’), because the preposition does not state clearly that the two transmitters met.<sup>45</sup> Muslim ibn al-Ḥajjāj stresses that this criticism is a late invention that had never been applied by scholars before, and he follows with two lines of argument: first, one should focus on the transmitters not on the transmission terms; and second, by examining thoroughly the transmitters, one will most likely be able to assess which mode of transmission was used—for example, a son can use *‘an* in his report from his father, and the transmission was surely through hearing (*sam‘a*) or reporting (*akhbara*). In short, for Muslim ibn al-Ḥajjāj, the transmission terms could not be considered out of context to evaluate *ḥadīth* authenticity. One could add one more

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<sup>45</sup> Muslim ibn al-Ḥajjāj, *Ṣaḥīḥ*, 19–20.

argument, namely that Mālik ibn Anas, for instance, seems to indicate indirect transmission through the use of the verb *balagha* and not with the *mu'an'an isnād*. Furthermore, students of Mālik, such as al-Laythī and 'Abd al-Razzāq, mostly used the *mu'an'an isnād*.

The mistrust towards *mu'an'an asānid* appears in this broader perspective to be a result of newly introduced criteria for *isnād* analysis from the time of Mālik ibn Anas and the two generations following him (the generations of al-Shaybānī's and al-Laythī's scribes). This change in the assessment of the *isnād* is reflected in the fact that most *asānid* from the canonical collections are mixed: they are *mu'an'an* from the Prophet's time to around the start of the second/eighth century, and then become non-*mu'an'an* with the more systematic use of verbs that indicate the mode of transmission. In these *asānid*, at least two different systems of reporting and organising transmission coexist and mark the two different historical periods to which they belong.

### 13.0. Conclusion and Outlook

The annotation of the different collections from Mālik's students highlights the great diversity of forms and contents in the *asānid* that were used during this limited period by a small group of scholars. The criticism against the *mu'an'an isnād* tackled by Muslim ibn al-Ḥajjāj indicates further that this diversity of forms was accompanied by a diversity of understandings regarding the content of the *isnād*. Through radical changes of context and added levels of subjectivity, it became increasingly challenging for the contemporaries of Muslim ibn al-Ḥajjāj to perceive or interpret

the *isnād* as their predecessors did. This applies all the more to today's historians, who stand even further away from the evolutive period of the *isnād* than Muslim ibn al-Ḥajjāj and his opponent.

The inexorable disadvantage of the elapsed time is alleviated by the advantage of the quantity of information at our disposal. Enlarging the scope of *isnād* studies with a list perspective and combining it with computational analysis is a way to exploit this advantage and enlarge the subjective lens through which we look at the past. With the analysis of a large number of *asānid* and the errors of automated recommenders, I have shown the importance of departing from assumptions and extrapolations and instead providing detailed observations of the object of study in order to delineate its contours accurately and account for its various forms and content. The knowledge thus acquired can now be used to build a representative corpus of texts for the automated recognition of the *isnād* in its diversity.

Of course, we are still lacking a large digitised corpus that directly reflects the manuscripts which are the ultimate source for textual analysis. We must therefore always keep in mind the possible editors' interventions at different levels. However, the number of scholarly curated corpora, like the one used in this study, is growing and the increasing interactions between manuscript studies and corpus linguistics is already improving the quality of these corpora. Likewise, collaborations between domain specialists and computer scientists are on the rise, leading to reduced computational expense and biases. Between the am-

biguous, where domain specialists are most at ease, and the univocal, where computer scientists thrive, there is an interdisciplinary middle ground which helps them both challenge existing assumptions and expand the perspectives of previous scholarship. Lists bring together ambiguous texts in a univocal order, and offer therefore a perfect object of study to challenge and please all scholars.