V. Drozdov,
St. Petersburg State University, St. Petersburg, Russia
E-mail: v.drozdov@spbu.ru
A. Šela
Institute of Polish Language (Polish Academy of Sciences, Krakow), Krakow, Poland
E-mail: artjoms.sela@ijp.pan.pl

PROBLEM OF THE AUTHORSHIP OF THE *'ISHQ-NĀME* ("THE BOOK OF LOVE") POEM ATTRIBUTED TO SANĀ'Ī FROM THE REGARD OF ACADEMIC ORIENTAL STUDIES AND MODERN COMPUTER TECHNOLOGIES

Abstract. One of the greatest Persian Sufi poets of the 12th century Sana'i (d. 535/1140 or 545/1150) is founder of the Sufi didactical *mathnawi* poem in Iran. His works exerted enormous influence upon many posterior authors in the Persian Sufi and secular poetry. But the problem of the authorship of Sana'i in regard to the short poems has been debated among the scientists during 20th century and right up to the nowadays. The paper covers the history of studying of the short poems attributed to Sana'i , special attention is devoted to *'Ishq-name* ("The Book of Love"), one of the main Sufi writing in the Persian literature on the subject of Mystical Love. For the definition of the authorship of this poem the paper proposes the using of the latest computational methods in particular digital stylometry. The paper tries to answer the question, who is the author of *'Ishq-name* poem: Sana'i or the Sufi *shaykh* and author of the 14th century 'Izz al-Din Mahmud Kashani (d. 735/1334–35).

Key words: Mystical love, Iranian Sufism, Sufi literature, Persian medieval literature, Persian writings on the subject of Mystical Love, stylometry, the using of computer technology in the definition of the authorship of oriental texts, Sana'i

Acknowledgement. The work was supported by RFBR grant No. 20-012-00187 "Attribution of the Medieval Persian and Afghan Poetry Texts via the Methods of Digital Stylometry".

The question of authorship of the *'Ishq-nāme* poem ("The Book of Love") conventionally attributed to Sanā'ī has been a focus of attention of historians of Persian literature for a long time, particularly as authorship of several other works attributed to Sanā'ī was questioned as well.

Ḥakīm Abu al-Majd Majdūd b. Ādam Sanā'ī Ghaznawī (d. 535/1140 or 545/1150) is a renowned Persian and Sufi poet who is considered to be the father of Sufi didactic poem in the Persian literature, followed by the outstanding Farīd al-Dīn 'Aṭṭār (d. 617/1220 or 632/1234) and Jalāl al-Dīn Rūmī (604—672 / 1207—1273). Sanā'ī's most reputed poem is *Ḥadīqat al-ḥaqīqa* ("The Garden of Spiritual Truth"), also known as *Ilāhī-nāme* ("Divine Book"), *Fakhrī-nāme* ("The Book to be Proud of") and *Sanā'ī-ābād* ("City of Grandeur").

The poem *Ḥadīqat al-ḥaqīqa* is as much mystical as it is moral and ethical, where theoretical elements are illustrated by exquisite novellas or short stories. Another work of Sanā'ī's, *Dīwān*, has been retained. It is a volume of verse of more than 10 thousand *bayt*s (some manuscripts contain more than 12 thousand *bayt*s) which include *qaṣīda*s, *ghazal*s, *rubā'ī*s, *qit'a*s, *tarjī'band*s and *tarkībband*s turning to, apart from the Sufi ethics, mystical knowledge and philosophy, reprobation of worldly ends and wine, praise of secular rulers, and mournful laments. *Inter alia*, Sanā'ī had written a number of small poems, authenticity of some of which has been questioned by researchers for more than a century and there is still no consensus as to which of them were undoubtedly created by Sanā'ī and which had been simply attributed to him in the later years.

All the researchers name *Ḥadīqat al-ḥaqīqa* and *Sayr al-'ibād ilā al-ma'ād* ("Travelling of God's Servants to the Other world" (lit. Arabic *ma'ād* — to the point of return)) among his authentic works. The latter contains 799 *bayt*s (*as per* the publication by M. Raḍavī [1]) and relates the story of a poet's journey to the Prophet. Along the way, he is helped by of a certain resplendent elder representing the sensible soul, and

meets numerous obstacles in the form of various worlds and cities. Another work attributed to him, the *Kār-nāme-yi Balkh* ("The Book of the Heroic Deeds of Balkh"), otherwise known as *Mutāyabe-nāme* ("The Book of Jokes") and consisting of 491 *bayt*s [2], is Sanā'ī's only non-mystical *mathnawī* which contains, along with praise for rulers and noble people of Balkh, satire on certain city officials of Balkh. Another poem that every researcher agrees belongs to Sanā'ī is *mathnawī Taḥrīmat al-qalam* ("Forbidden by the Reed Pen") consisting of 103 *bayt*s [3] where the author speaks to a reed pen representing universal mind and receives its instructions and precautions as well as explanations of the Sufi understanding of truth and knowledge.

M. Raḍavī mentions his doubts whether *'Ishq-nāme* was indeed written by Sanā'ī [4]. Having acquainted himself with the poetic commentary to the tractate *al-Savāniḥ fī al-'ishq* ("The Revelations on Love") written by Aḥmad Ghazālī (d. 520/1126), younger brother of Abū Hāmid Muḥammad Ghazālī (d. 505/1111), and published by Gulchīn Ma'ānī under the name of *Kunūz al-asrār wa rumūz al-aḥrār* ("The Treasures of the Secrets and the Symbols of the Righteous") [5], M. Raḍavī noted that, preface excluded, the text of this poetic commentary is similar to the text of *'Ishq-nāme*. With that knowledge in mind, M. Raḍavī's view that Sanā'ī was not the author of the poem was reinforced.

In a book by a Swedish researcher B. Utas, the issues of the authenticity of Sanā'ī's poem *Ṭarīq al-taḥqīq* ("The Path of Verification") and the history of this and other poems, both authentic and wrongly attributed to Sanā'ī, are being discussed. The book also offers to the reader a critical text of *Ṭarīq al-taḥqīq* and exhaustive description of its contents with a philological commentary [6]. B. Utas notes that *'Ishq-nāme* is a somewhat shortened version of the poem *Kunūz al-asrār wa rumūz al-aḥrār* compiled, in all appearance, by a well-known mystic 'Izz al-Dīn Maḥmūd Kāshānī (d. 735/1334–35) better known as a commentator on the works of an Andalusian mystic and philosopher Ibn 'Arabī (560—638 / 1165—1240) [7]. The poem is a poetic and explanatory paraphrase of the tractate *al-Savāniḥ fī al-'ishq* by Aḥmad Ghazālī. Shaykh Maḥmūd Kāshānī's name is the only one that is mentioned concerning authorship of the *Kunūz al-asrār* poem in the Istanbul university manuscript. The poem itself is of significant interest as its shorter version, under the name of *'Ishq-nāme*, was later attributed to Sanā'ī [8]. B. Utas emphasizes that beginning from 11th/17th century, manuscripts started to credit Sanā'ī with authorship of the poem. *'Ishq-nāme* in its turn was indeed considered written by Sanā'ī, and only M. Raḍavī who prepared his own publication of the poem was able to discover that it was nothing more than a slightly shortened version of *Kunūz al-asrār*, published two years prior by Gulchīn Ma'ānī in the Philology department's journal of the Tehran university [9].

According to a Dutch Iranist de Bruijn, the poem *'Ishq-nāme* is a poetic commentary on a prosaic work, *Savāniḥ* by Aḥmad Ghazālī. De Brujin states that it was written not by Sanā'ī, but by 'Izz al-Dīn Maḥmūd Kāshānī [10].

In 1389/2010, contemporary Iranian philologists 'Abd al-Majīd Sayf and Ghulām Ḥusayn Murāqibī issued a new edition of Sanā'ī's short poems. They have included *'Aql-nāme*, *'Ishq-nāme*, *Sanā'ī-ābād*, *Taḥrīmat al-qalam*, *Tarīq al-taḥqīq* and *Kār-nāme-yi Balkh* into this edition. This publication of Sanā'ī's poems was based on the one of 1348/1969, made by the best expert on Sanā'ī's work, Iranian philologist Mudarris Raḍavī. The preface of the edition bears no evidence of the authorship problem of the short poems attributed to Sanā'ī, which underlines the fact that the publishers ignore it and believe all poems published by them to have been written by Sanā'ī [11].

Let us turn to *'Ishq-nāme* attributed to Sanā'ī. Ma'ānī, who had published the *Kunūz al-asrār*, poem by an unknown author explaining the *al-Savāniḥ fī al-'ishq* tractate by Aḥmad Ghazālī [12], did not notice that the poem, in its larger part, is identical to *'Ishq-nāme*, then considered written by Sanā'ī. M. Raḍavī was the first to pay attention to that fact [13]. According to B. Utas, in another manuscript of the poem, not known and not used by Ma'ānī, the name of Maḥmūd Kāshānī is mentioned in his capacity of the author of *Kunūz al-asrār*. He may be identified with 'Izz al-Dīn Maḥmūd Kāshānī Natanzī, the author of *Mithbāḥ al-hidāya wa miftāḥ al-kifāya* ("The Lantern Directing to the Right Way and the Key to the Sufficiency [of the Mystical Knowledge]") — the most famous Persian translation of the *'Awārif al-ma'ārif* ("Gifts of Divine Knowledges") tractate by Sufi *shaykh* and theologist of the Shāfi'iya school and founder of the Sufi order of Suhravardīyya Shihāb al-Dīn Yaḥya b. Habash Suhrawardī (539—622 / 114—1234) [14]. Thus, Maḥmūd Kāshānī is a student of Nūr al-Dīn 'Abd al-Samad b. 'Ali Iṣfahānī Natanzī (d. 699/1299—1300) [15].

As can be seen from the above, *Kunūz al-asrār* had eventually lost its preface (presumably 83 *bayt*s) and became known as Sanā'ī's poem *'Ishq-nāme*. It was published five times: in Gazna in 1332/1953, along with other four rare works by Sanā'ī; in Tehran by Aḥmad Gulchīn Ma'ānī in 1345-46/1967 under the name of *Kunūz al-asrār* in the Philology department's journal of the Tehran university; in Tehran in 1348/1969 by M. Raḍavī under the name of *'Ishq-nāme* among other poems by Ḥakīm Sanā'ī; in Tehran in 1372/1993 by A. Mujāhid under the name of *Kunūz al-asrār* in the book "Three Commentaries on *Savāniḥ al-'ushshāq* by Aḥmad Ghazālī"; in Tehran in 1389/2010 by 'Abd al-Majīd Sayf and Ghulām Ḥusayn Murāqibī under the name of *'Ishq-nāme* as one of Sanā'ī's six poems.

The *'Ishq-nāme* poem attributed to Sanā'ī in M. Raḍavī's version consists of 579 *bayt*s and, as was mentioned earlier, lacks the preface of 83 *bayt*s where Allah, the Prophet and faithful khalifs are praised, as well as it lacks a small chapter on the circumstances of birth of this poetic commentary on *Savāniḥ*. That preamble has no bearing on the text of *Savāniḥ* and is followed by the core part of *Kunūz al-asrār*, fully identical with the text of *'Ishq-nāme* which is, according to the author's intention, a commentary on *Savāniḥ* by Aḥmad Ghazālī. *'Ishq-nāme* contemplates true love and its stages, imma-

nent qualities of lovers, old and new love; there are stories introduced into the text in order for them to exemplify various principles of mystical love and illustrate the topic. This poem was considered one of the main works dedicated to love and mystical knowledge. It is written in its own style and artistic manner and demonstrates the outstanding talent and erudition of the author. The poem begins and ends by describing love.

If we were to compare description of love in *'Iṯhq-nāme* attributed to Sanā'ī and prosaic work *Miṯhbāḥ al-hidāya wa miftāḥ al-kifāya* by 'Izz al-Dīn Maḥmūd Kāshānī [16], we would see very little in common. In *'Iṯhq-nāme*, the psychology of relations between love, its subject and its object is paramount among with ulterior, hidden, implied states of being, whereas *Miṯhbāḥ al-hidāya* deals with the topic of love in accordance with guide books well-known and wide-spread among Sufi. Here is an abstract of *'Iṯhq-nāme* where the difference between ancient, i. e., godly and perfect, love and new, i. e. mundane and man-created, love is explained.

On Ancientness and Newness of Love

What image changeable and fickle time shall draw from behind the veil? What *qibla* [17] does love have, what medicine for pain is there to be found? The kingdom of love belongs to the sphere of the Eternal [God], its face is turned to the One [God]. The essence (*ḏhāt*) of the Possessed of Glory [God] became the source of love, that is why love is pure and eternal. Could it be that the "He loves them" [18] argument is not enough, for everything else is nothing but lust (*hawas*). Perished love is ancient and not new, and since it [i. e. new love — *V. D.*] has only recently emerged (*ḥidthān*), its sign is new [19].

And [this] new love shall have the power to enter the palace (*sarādaqāt*) of anterior eternity (= anterior love). Love is of a like nature to a pure edifice: it is far from vice and separated from the vicissitudes of fate. New love is a reflexion of the shining [of the ancient love], and coolness (*namī)* [of the new love] comes from the excess of the flow (*tarābiṯh*) [of the anterior love]. Even if this [new] love gazes at the trace (*aṯhar*) [of the anterior love], this gaze is but a reflexion of that gaze. Know, however, that if you observe [the new love], so doing is similar to following the traces [of the anterior love]. If a stirrup holder (*rikābī*) brings to you a racehorse (*markab*) with the ear mark *(dāġh*) of a shah, touching its thigh (*raʾn*), you shall see that the shah will mount that horse and it will be no fault (*naqs*) of the stirrup holder [20]. Even though the shah of love has settled [on the day of the Primal Covenant between God and Man] in the heart, ear-mark (*dāġh*) is the share of the spirit. While it [the spirit] is the padishah's favourite horse, he is concealed from misfortune, persevering in his movement [even though] in the beginning of the movement [spirit, meaning horse] may be a prisoner of other [than love] horse-master. But how to single out the trace (*aṯhar*) belonging to another, when the obligation (*ṣharṭ*) [to master the horse, i. e. the spirit — *V. D.*] is the beginning [of love — *V. D.*] [21].

To put this in perspective, we have included into the text below a translation of the fragment from the part on love of chapter ten which deals with love of the *Miṯhbāḥ al-hidāya* by 'Izz al-Dīn Maḥmūd Kāshānī:

> Know that the foundation of all heightened mystical states stems from love just as the foundation of all heightened Sufi stages stems from repentance (*tauba*) [22]. Because pure love is a [divine] gift, all [mystical] states based on it are as well gifts (*mawāhib*). And love is a hidden aspiration for the world of beauty of two kinds: ordinary love means aspiration of the heart to contemplate attributes of love, and special love means aspiration of the spirit to contemplate the beauty of essence. Ordinary love is the moon seen in places where the attributes of love rise, while special love is the sun rising from the horizon of essence. Ordinary love is the light ornamenting the existence, and special love is the fire cleansing the existence. [They say] about ordinary love: "Take what is pure and leave what can be obscure", and about special love [they say in the words of Qur'ān]: "does not leave and does not abandon" (*lā tubqī wa lā taḏharu*) [23]. Ordinary love is wine sealed and diluted (*raḥīq-i makhtūm-i mamzūj*) [24], and special love is pure untainted fountain in Paradise (*tasnīm-i ṣirf-i khāliṣ*) [25].
>
> Should wine be not pure, drinking it,
> To my thinking, is prohibited even be it [sparkling]
> like fire (*lahab*).
> And if love is not genuine,
> then the lover,
> His heart wonder-struck, will find himself between the truth and the lie.
>
> Ordinary love, being mixed with selfish desire, is a drink that bears both purity and muddiness, tenuity and substance, lightness and heaviness. And special love, not being mixed with depletion arising from illnesses (= vice) (*aʿlāl*), is wholesome purity and complete lack of density, real lightness.
>
> I swear by the chalice that we drank thanks to [God's] mercy.
> It appears that the drink in the chalice is air.
> We weighted the chalice empty and full;
> And the weight was the same.
>
> Moreover, tenuity (*laṭāfat*) and lightness (*khiffat*) of the drink influence the attenuation (*talṭīf*) and lightening (*takhfīf*) of the chalice, and its density (*kathāfat*) becomes softness (*laṭāfat*), and heaviness (*thiql*) becomes lightness as it does in case of the spirit which endows the body with softness (*laṭāfat*) and lightness (*khiffat*).
>
> Drinking glasses that we emptied were heavy
> Until they were full of purest wine.
>
> They became light and almost scattered in the air because of their contents.
> Truly, bodies are light thanks to the spirits (*arwāḥ*).
>
> Those in love with essence drink that drink in the chalices of spirits (*arwāḥ*), and what remains and what is in excess is poured onto the hearts and souls: [for] noble chalices have something even for the soil. To spirits, [the

drink] will give the lightness of unrest, to hearts will give the lightness of yearning (*shauq*), to souls will give the lightness of obedience. And the pleasure (*ladhdhat*) from that drink shall influence all parts of the body: to spirit, [the drink] will give the pleasure to contemplate, to heart, the pleasure to remember, and to soul, the pleasure of serving God as ordinary Muslims do (*mu'āmalāt*) [26] until the pleasure of obedience of the soul will not overcome all bodily pleasures — and that is the spiritual state to which calls the Prophet, let him be blessed by Allah, and greet: "Oh God! Make [my] love to You sweeter for me than my own soul and my hearing, my sight and my family, and my possessions, and cold water". And the essence of chalice, because of the excessive purity and [extraordinary] attenuation is so dissolved in the colour of the drink that there is left no difference [between the chalice and the drink], and there appears an image (*ṣūrat*) of unity (*waḥdat*).

The drinking glass became so thin and the wine so diluted,
And now they are so alike, and [our] situation so difficult:
It is as if though there is wine but there is no chalice,
and at the same time there seems to be a chalice, but no wine [27].

Rendition of the topic of love in the *'Ishq-nāme* poem attributed to Sanā'ī and in the prosaic work *Miṯhbāḥ al-hidāya* by 'Izz al-Dīn Maḥmūd Kāshānī differ significantly and, as a matter of fact, have little in common: one could say perhaps that these two literary works could not have been written by the same author. The reason for this difference, however, is that *'Ishq-nāme*, otherwise known as *Kunūz al-asrār*, is a poetic commentary on the first literary work concerning the psychology of mystical love in Persian literature, the *al-Savāniḥ fi al-'ishq* by Aḥmad Ghazālī, while *Miṯhbāḥ al-hidāya* is a slightly modified Persian translation of one of the main Arabic Sufism guide books, the *'Avārif al-ma'ārif* tractate by a Shihāb al-Dīn Suhrawardī.

In order to establish the authorship of the *'Ishq-nāme* poem attributed to Sanā'ī, it is necessary to juxtapose the style of the poem to the style of Sanā'ī's other, veritable poems. Cutting-edge computer technology, particularly the newly-born discipline of stylometry, could be of great aid in this matter. Stylometry strives to quantify differences in style, seeing it as a set of measurable features that present themselves in a unique way in each text. Such features are numerous: length of words, length of sentences, frequency of usage of this or that word, poetical form (rhythm and rhyme). One of the spheres of application of stylometry is attribution of authorship — a demonstration of how an author's identity is expressed in the features of a text. In an experiment kindly conducted following our request by a leading expert in the field, a researcher of the Institute of Polish language in Krakow Artjoms Šela, the following materials were used: 1) The *Manṭiq al-'ushshāq* poem ("The Language of Lovers") or *Dah-nāme* ("Ten Love Letters") (written in 706/1306–07) by a Persian poet Auḥadī-yī Marāghe'ī (d. 738/1338). It is an allegoric mystical poem about love containing 515 *bayt*s; 2) The *'Ushshāq-nāme* poem (written in 751/1350) by a Persian poet 'Ubayd-i Zākānī (d. 772/1371). It is a non-mystical poem about love applying Sufi imagery and metaphors containing 723 *bayt*s; 3) The *'Ushshāq-nāme* poem, or *Dah-faṣl* ("Ten Chapters") by a Persian Sufi poet Fakhr al-Dīn 'Irāqī (610—689 / 1213—1289). It is a purely mystical poem about heaven-born love containing 1063 *bayt*s; 4) *Dīwān* by Fakhr al-Dīn 'Irāqī containing more than 4800 *bayt*s and including *ghazal*s — 3070 *bayt*s, *qaṣīda*s — 760 *bayt*s, *qiṭ'a* — 43 *bayt*s, strophic verse (*tarjī'band*s and *tarkībband*s) — 620 *bayt*s, *rubā'ī*s — 334 *bayt*s (167 *rubā'ī*s); 5) The *Rauḍat al-muḥibbīn* poem ("The Garden of Lovers"), or *Dah-nāme* ("Ten Love Letters") (written in 794/1392) by a Persian poet Ibn 'Imād-i Shīrāzī (d. 800/1397–98). It is an allegoric mystical poem about love containing 760 *bayt*s; 6) The *Sayr al-'ibād ilā-l-ma'ād* by Sanā'ī-yi Ghaznawī. It is a mystical and philosophical poem about the travelling of a soul — the narrator of the story guided by an acting reason — to the other world. The topic of love is not touched upon in this work containing approximately 800 *bayt*s; 7) The *Ḥadīqat al-ḥaqīqa wa sharī'at al-ṭarīqa* ("The Garden of Spiritual Truth and Religious Rule on the Path to God") Sanā'ī-yi Ghaznawī, particularly its fifth chapter, "About Love", containing 520 *bayt*s. It is a description of purely mystical love; 8) The *'Ishq-nāme* poem attributed to Sanā'ī otherwise known as the poetic commentary *Kunūz al-asrār* by 'Izz al-Dīn Maḥmūd Kāshānī. It is a description of purely mystical love and contains more than 580 *bayt*s.

The materials analyzed could be separated into the following groups:

(i) Poems describing purely mystical (Sufi) love: *'Ishq-nāme* attributed to Sanā'ī; fifth chapter from Sanā'ī's *Ḥadīqat al-ḥaqīqa*; *'Ushshāq-nāme* by 'Irāqī;

(ii) Mystical and allegorical poems about love: *Manṭiq al-'ushshāq* or *Dah-nāme* by Auḥadī-yī Marāghe'ī and *Rauḍat al-muḥibbīn* or *Dah-nāme* by Ibn 'Imād-i Shīrāzī;

(iii) Non-mystical poems about love using Sufi symbols and metaphors — *'Ushshāq-nāme* by 'Ubayd-i Zākānī;

(iv) Mystical and philosophical poems about travels of a soul — a pilgrim in search of celestial presence — *Sayr al-'ibād ilā al-ma'ād* by Sanā'ī-yi Ghaznawī;

(v) *Dīwān* by 'Irāqī, embracing a wide number of Sufi problems: love to God, love to a beloved (*ghazal*s); praise of God, the Prophet and Sufi *shaykh*s (*qaṣīda*s); mystical theories of love, theories of mono-existence (strophic verse); messages to friends and relatives (*qit'a*); love to Friend, love to God, description of wine and nature according to Sufi understanding (*rubā'ī*s).

Let us introduce the description and results of the experiment concerning attribution of authorship of the *'Ishq-nāme* to the Persian poet Sanā'ī.

Verification of Authorship of the *'Ishq-nāme* Poem

We turn to modern multivariate stylometry to see if computational models would provide an additional evidence for disputed authorship. We will rely on the frequencies of the most frequent words as reliable features of stylistic identity, as it was demonstrated an abundance of times [28]. The use of so-called "function words" from the top of the word frequency list often significantly varies among individuals which allows to distinguish their mostly unconscious writing habits, or stylistic signatures [29]. However, in the case of attributing poetic texts the main problem often encountered is the insufficient text size: robust lexical patterns do not have space to express themselves in short texts [30]. Recent research in versification increases reliability of attribution by adding formal features of verse — like rhythm patterns and rhyme composition [31]. However, the lexical-based attribution even in short poetry samples still remains quite relevant. Given availability of relatively large samples (~5000 words) in our scenario, we proceed with the simplest setup possible. In all experiments we rely on stylo library for R software [32], wrapping its functions in custom-made experimental scenarios.

The only plausible candidate for the authorship of "The Book of Love" in our corpus of poetic texts is Sanā'ī. This means that the main goal of stylometry experiments is verification of authorship, instead of attribution. Attribution setup usually has closed set of candidates to which an unknown text is being attributed. In verification, which is usually considered more general task, a goal is to verify if a text could have been written by the only "suspect" author [33]. We use other poets as a set of "impostors", a background against which stylistic features of Sanā'ī and "The Book of Love" would be matched. The table provides text size summaries (in number of tokens / words).

Table 1

Size of Works Present in the Study Corpus (in Number of Words)

Author	Title	Meter	Number of Words
Shīrāzī	*Rauḍat al-muḥibbīn*	*Hazaj*	7607
'Irāqī	*Dīwān*	Misc.	60836
'Irāqī,	*'Ushshāq–nāme*	*Khafīf*	10640
Marāghe'ī	*Manṭiq al-'ushshāq*	*Hazaj*	6268
Sanā'ī	*Ḥadīqat al-ḥaqīqa wa sharī'at alṭarīqa*	*Khafīf*	5861
Sanā'ī?	*'Ishq-nāme*	*Khafīf*	6383
Sanā'ī	*Sayr al-'ibād ilā-l-ma'ād*	*Khafīf*	8466
Zākānī	*'Ushshāq–nāme*	*Hazaj*	7943

The minimal text size in the corpus is 5000 words. This would serve as a natural limit for our sampling strategies, so that all experiments would use comparable sample sizes. Another concern is metrical heterogeneity of the corpus. Three texts are written in *hazaj*, four — in *khafīf*. 'Irāqī's *Dīwān* includes poems of various meters. If we remove it and do the exploratory clustering of texts [34], then our texts will be distributed across two metrical "hyperclusters" (*fig. 1*).

To minimize future structural bias that is introduced with meter, we might want to remove features (words) that are mostly associated with the metrical groups. We do it by correlating features of texts with their metrical classes (*fig. 2*):

##	Eta2 P-value		
##	اميدواري	0.98	2e-05
##	بسترس		
##	بريد		
##	پرداز		
##	ريشم		
##	زارم		
##	سرمای		
##	غمناک		
##	فتنه		
##	کارگر		

In following experiments these words are excluded to counter the natural similarity of same-meter texts to each other. This would not neutralize the global effect of poetic meter on natural language, but at least some control over these features is important.

For a start, we want to test our experimental method in "ground truth" cases where there is no doubt in true authorship of a text. To do this, we take 'Irāqī and Sanā'ī, since they are the only authors in our corpus that have two different texts. We want to test how random samples of 5000 words are recognized as samples "of the same author". We use a method known as "general impostors" [35]: it is an iterative attribution of a fragment X to all other authors in the corpus (including the one who actually wrote X). The confidence in attribution is expressed as a proportion of cases in which the fragment was the nearest neighbour to author A, as a results of N iterations. Here we run each of 20 independent sample pools of 5000 words per each text 1000 times across all texts in corpus (excluding the "The Book of Love") (*fig. 3*).

Boxplots show the distribution of confidence values after each of 20 series of 1000 iterations. Vertical line shows median value, boxes 50% range of all values, whiskers — 95% percentile. Despite significant variation in samples, 'Irāqī remains the only plausible candidate for an authorship of the *Dīwān* (which we know he

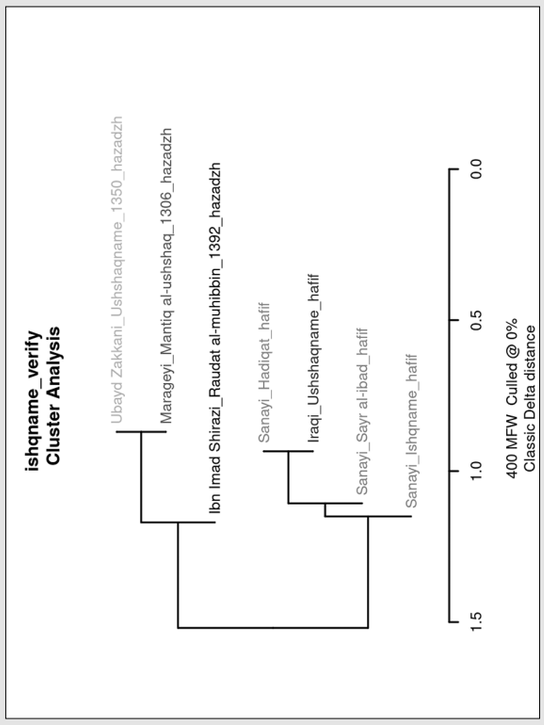

Fig. 1

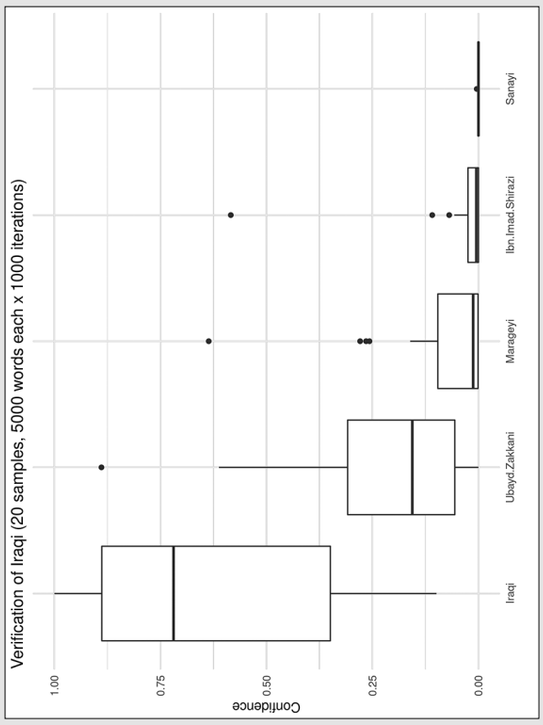

Fig. 3

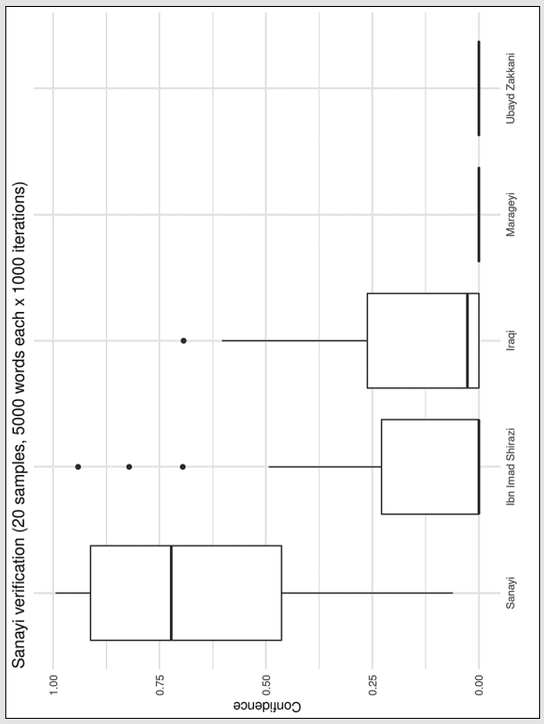

Fig. 4

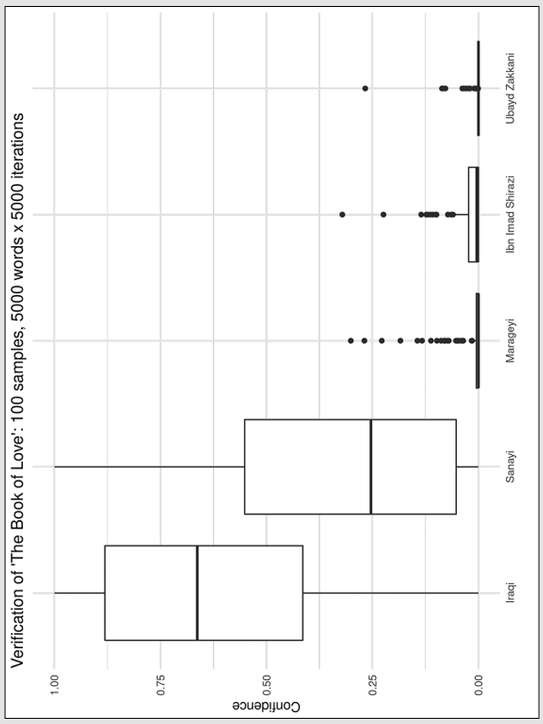

Fig. 5

meter
hafif
hazadzh
-2
-1
0
1
2

Fig. 2

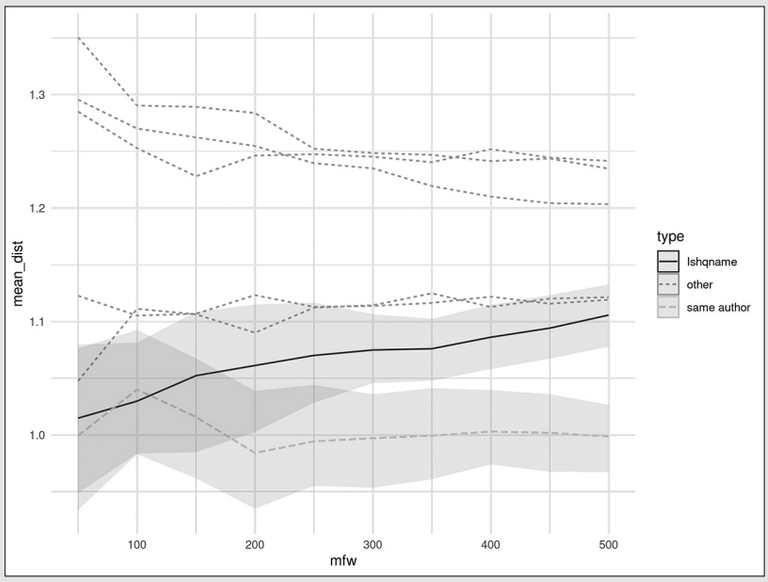
mean_dist
1.3
1.2
1.1
1.0
100
200
300
400
500
mfw
type
lshqname
other
same author

Fig. 6

wrote). If we repeat the same experimental setup for undisputed works of Sanā'ī, we see similar picture (*fig. 4*).

The current setup of the corpus and sample size, as it is evident, is far from being certain about true authorship. However, there is the tendency to verify a text against it is true author. We certainly pick upon some authorial signal.

Now we can repeat the verification with "The Book of Love" being included. Instead of 20 random samples of 5000 words, we take 100 and repeat 1000 iterations for each. In each iteration features for analysis is also picked randomly, algorithm takes between 50% and 90% of the 500 most frequent words. In same fashion, a distance measurement is picked randomly in each series of the experiment (classic delta, cosine delta, min-max) (*fig. 5*).

Our primary (and only) candidate for the authorship of "Book of Love" is Sanā'ī and he even loses the competition to 'Irāqī, who is not even considered a plausible candidate. It is important to note, that the method that is used here will always assign a nearest neighbour to a text without any estimation how "true" this assignment is. The high uncertainty and dispersion of our results could be seen as indicative of the lack of a true author in the corpus. Then, the "similarity" of "The Book of Love" to 'Irāqī and Sanā'ī might be driven by other factors, like meter or theme (or both). In any case, the results show that probability of Sanā'ī being an author of "The Book of Love" is small — this does not mean, it is non-existent. As we shown, our certainty in this experimental scenario is limited.

We can try to visualize the processes behind verification experiments. To do this, we calculate distances between two random samples taken from "true" Sanā'ī, using different most frequent word cut-offs for analysis. Resulting average distances then are compared to sets of distances between "true" Sanā'ī and other authors in the corpus. This gives us an estimation of how same-author samples from "uncontested" Sanā'ī behave compared to other-author samples. Using these results as a "map" of same *vs.* other author similarity, we add distances from samples from "The Book of Love" to samples from Sanā'ī. We can now see how the contested poem behaves: as Sanā'ī text (the curve is close to curve of Sanā'ī *vs.* Sanā'ī distances), or text plausibly written by someone else (the curve is close to Sanā'ī *vs.* others distances) (*fig. 6*).

The lines on a plot show average distances, grey zone is 95% percentile interval of the distance distribution. 100 distance calculations were made in each MFW cut-off. Dark grey lines are the distances of "other authors" to Sanā'ī, while the dark solid line shows distances between the "The Book of Love" and Sanā'ī. The solid line quickly leaves the space of Sanā'ī plausibility and approaches distances of "others" ('Irāqī and Shīrāzī).

Authorship verification results do not show any strong preference for *'Ishq-nāme* as work of Sanā'ī. Uncertainty in the behaviour of general impostors tells us that the true author of the poem is most likely not present in the corpus. However, these methods also cannot fully resolve this question, given the corpus limitations. The final test, which does not rely on randomly sampling features, shows that some stylistic similarity between Sanā'ī works and *'Ishq-nāme* is present at the level of the most frequent word. This not an insignificant evidence, but it does not eliminate our doubt in Sanā'ī authorship.

Conclusion

The lexical differences revealed when comparing the authentic poems of Sanā'ī and the *'Ishq-nāme* indicate discordance in the idiocrasies of two authors. Even the terms widely known in Sufi Persian poetry are used by Sanā'ī and the author of "The Book of Love" in a completely different amount. This also indicates that the real Sanā'ī had no concern with "The Book of Love".

The stylometry experiment confirmed the supposal of some Iranian and Western scientists from 50 years ago that the poem *'Ishq-nāme* is not the work of Sanā'ī, but belongs to some other author, most likely to 'Izz al-Dīn Maḥmud Kāshānī.

Notes

1. Raḍavī (ed.), 1348/1969.
2. *Ibid.*
3. *Ibid.*
4. *Ibid.*: 4—6 of preface.
5. Gulchīn Ma'ānī (ed.), 1345/1967; idem, 1346/1967.
6. Utas, 1973.
7. Gulchīn Ma'ānī (ed.), 1345/1967; idem, 1346/1967.
8. Utas, 1973: 17—18, 53—54, 101, 131—132.
9. Gulchīn Ma'ānī (ed.), 1345/1967; idem, 1346/1967.
10. de Bruijn, J. T. P, 1997.
11. Muraqibi, 1389/2010: 5—12.
12. Gulchīn Ma'ānī (ed.), 1345/1967; idem, 1346/1967.
13. Raḍavī (ed.), 1348/1969: 6 of preface.
14. Utas, 1973: 54.
15. Mujāhid, 1372/1993: 14.
16. Kāshānī, 1394/2015: 404—411 (section 1 "On Love", from the 10th chapter).
17. *Qibla* is the direction towards the Ka'ba in the Sacred Mosque in Mecca, which is used by Muslims as the direction of prayer, the object of worship, the side to which the mystic turns his gaze to contemplate God. The object of love is not important, because its essence rises above the directions and it does not need to turn in any particular direction. Where time leads it is unknown, because its goal is insignificant.
18. Qur'ān, 5:59(54): "He loves and who love Him" (translation by A. J. Arberry). The idea that love in general comes from the beloved is developed here (in relation with this Qur'ānic *āya*) only as applied to divine love. God's love for us is the basis for our being: because He loves, He created us. In a figurative sense: when love struck us, we rode out of obliv-

ion into existence. Our being is supported by love. If love leaves us, we will enter into oblivion again.

19. Anterior love is true divine Love that existed before the appearance of a human in this world and it is his essence. Coming on the mortal coil a person loses divine Love and acquires a new one, which is no longer his essence, but only an attribute; at the same time, the new love, being a reflection of the anterior one, is connected with it. After the elimination of human existence by God, instead of it a kind of being appears, resting on an ancient, true Love.

20. A stirrup holder can never call a racehorse (love) his possession. Love belongs to God who is the sovereign. But this does not mean that the one who holds the stirrup bears losses or commits an offence: after all, sometimes love is the saddle of the supreme animal (spirit). God decides that the horse intended for the shah is first ordered to be gentled by the rider. And so is earthly love that is a bridge to a heavenly one.

21. Raḍavī (ed.), 1348/1969: p. 20—21.

22. *Tauba* is a Sufi "station" (repentance for having to live in this world and committing sins). *Tauba* presupposes the forgiveness of sins, obedience to the divine command, the transition from chastity to submission to God. The mystic should understand what a sin is, in order to then turn away from it. There are three types of repentance: (i) ordinary repentance of ordinary believers; (ii) special repentance of chaste people; (iii) the most valuable repentance is the contrition of the mystics. One can free himself and cleanse himself from sins only with the help of repentance, for it is the basis of all Sufi stations and stages. There are five pillars (*arkān*) of "repentance": (i) following obligatory prescriptions of the religion, i. e. ceremonies and rituals; (ii) compensation of what was missed in due time; (iii) striving only for what is permitted by religious law; (iv) abandoning of evil deeds; (v) fighting the carnal soul (*nafs*).

Also five degrees (*darajāt*) of repentance are distinguished: (i) repentance for the actions, which means abnegation from vicious deeds and turn to pious ones; (ii) repentance of those who have renounced our world (*zuhhād*) implies a rejection of the interest in our world hidden in the soul and its replacement with complete indifference to it; (iii) the repentance of those striving for the divine presence (*ḥuḍūr*), for intimacy with God, implies the abandonment of negligence (*ghaflat*); (4) the repentance of people who are able to change their character (*mutakhalliqān*) means the abandonment of vicious character traits in favour of the approved ones; (v) the repentance of the mystics is the refusal of the mystic to consider his blessings for the sake of seeing only God. Doing good deeds mystics should repent that they pay their attention to them. Instead they should see only the deeds of God. See: Sajjādī, 1373/1995: 264—266.

23. Qur'ān, 74:28.

24. Allusion to Qur'ān, 83:25: *yusqawna min raḥīqin makhtūmin*, "as they are given to drink of a wine sealed" (translation by A. J. Arberry).

25. Allusion to Qur'ān, 83:27—28: *wa mizājuhu min tasnīmin 'aynāan yashrabu bihā al-muqarrabūna*, "And whose [i. e. this wine — *V. D.*] mixture is Tasnīm, a fountain at which do drink those brought nigh" (translation by A. J. Arberry).

26. *Mu'āmala* (Arabic) — to do business with someone, to trade. Among the mystics, the term means ordinary worship, the religion of ordinary Muslims, observance of all religious precepts. In this case worshipers of God hope for reward in the future life and compensation (*'avaḍ*) for their obedience, forgetting about dignity and wisdom. Therefore, God's people or mystics consider ordinary Muslims to be traders who believe in order to go to heaven and to avoid hell. See: Sajjādī, 1373/1995: 728.

27. Kāshānī, 1394/2015: 404—411 (section 1 "On Love", from the 10th chapter).

28. See e. g. Evert et al., 2017.

29. Kestemont, 2014.

30. Eder, 2017.

31. Plecháč, 2021.

32. Eder, Rybicki & Kestemont, 2016.

33. Halvani, Winter & Graner, 2019.

34. Frequencies of 400 most frequent words, classic Delta distance (Burrows, 2002), Ward's linkage.

35. Kestemont et al., 2016.

References

Burrows, J. (2002), "'Delta': a measure of stylistic difference and a guide to likely Authorship", *Literary and Linguistic Computting*, No. 17/3, pp. 267—287.

de Bruijn, J. T. P. (1997), *Persian Sufi Poetry. An Introduction to the Mystical Use of Classical Persian Poems*, Surrey: Curzon Press.

Eder, M. (2017), "Short samples in authorship attribution: a new approach", *12th Annual International Conference of the Alliance of Digital Humanities Organizations, DH 2017, Montréal, Canada, August 8—11, 2017, Conference Abstracts*, Montreal: McGill University, pp. 221—224. [Online]. Available from: https://dh2017.adho.org/abstracts/341/341.pdf [Accessed: 12.12.21].

Eder, M., Rybicki, J. & Kestemont, M. (2016), "Stylometry with R: a package for computational text analysis", *R Journal*, No. 8/1, pp. 107—121. [Online]. Available from: https://journal.r-project.org/archive/2016/RJ-2016-007/index.html [Accessed: 12.12.21].

Evert, S., Proisl, T., Jannidis, F., Reger, I., Pielström, S., Schöch, C. & Vitt, T. (2017), "Understanding and explaining delta measures for authorship attribution", *Digital Scholarship in the Humanities*, No. 32 (suppl_2), pp. 4—16.

Gulchīn Ma'ānī, A. (1345/1967) (ed.), *Kunūz al-asrār wa rumūz al-aḥrār* [*The Treasures of the Secrets and the Symbols of the Righteous*], *Majalle-yi dānishkade-yi adabīyāt wa 'ulūm-i insānī-yi dānishgāh-i Tihrān*, vol. 14, No. 3, pp. 328—351.

Gulchīn Ma'ānī, A. (1346/1967), *Kunūz al-asrār wa rumūz al-aḥrār* [*The Treasures of the Secrets and the Symbols of the Righteous*], *Majalle-yi dānishkade-yi adabīyāt wa 'ulūm-i insānī-yi dānishgāh-i Tihrān*, vol. 14, No. 3, pp. 494—522.

Halvani, O., Winter, C. & Graner, L. (2019), "Assessing the applicability of authorship verification methods", [Online]. Available from: *arXiv:1906.10551 [Cs, Stat]* [Accessed: 12.12.21].

Kāshānī, ʻIzz al-Dīn Maḥmūd b. ʻAlī (1394/2015), *Mithbāḥ al-hidāya wa miftāḥ al-kifāya* [*The Lantern Directing to the Right Way and the Key to the Sufficiency [of the Mystical Knowledge*]], foreword, revision, explanation, edition of the text by Jalāl al-Dīn Humajī, Tehran: Sukhan Publishing House.

Kestemont, M. (2014), "Function words in authorship attribution. From black magic to theory?", *Proceedings of the 3rd Workshop on Computational Linguistics for Literature (CLFL)*, Gothenburg: Association for Computational Linguistics, pp. 59—66.

Kestemont, M., Stover, J., Koppel, M., Karsdorp, F. & Daelemans, W. (2016), "Authenticating the writings of Julius Caesar", *Expert Systems with Applications*, No. 63, pp. 86—96.

Mujāhid, A. (1372/1993), "*Savāniḥ. Muqaddame-yi muṣaḥḥiḥ*" ["Revelations. Editor preface"], *Shūrūḥ-i Savāniḥ (Sī sharḥ bar Savāniḥ al-ʻushshāq-i Aḥmad Ghazālī)*, Tehran: Surush Publishing House, pp. 7—17.

Plecháč, P. (2021), *Versification and Authorship Attribution*, Prague: Karolinum Press.

Raḍavī, M. T. (1348/1969) (ed.), *Mathnawī-yi Ḥakīm Sanāʼī bā inḍīmām-i sharḥ-i Sayr al-ʻibād ilā al-maʻād* [*Poems of Ḥakīm Sanāʼī with the Attachment of a Commentary on the Poem "The Journey of God's Servants to the Otherworld"*], Tehran: Tehran University Press.

Sajf, ʻA. & Muraqibi, Gh.-Ḥ (1389/2010), "Pishguftar" ["Preface"], *Mathnawī-yi Sanāʼī: ʻAql-nāme*, *ʻIshq-nāme*, *Sanāʼī-ābād*, *Taḥrīmat al-qalam*, *Tarīq al-taḥqīq*, *Kār-nāme-yi Balkh*, Tehran: Tehran University Press, pp. 5—12.

Sajjādī, S. J. (1373/1995), *Farhang-i lughāt-i iṣṭilāḥāt wa taʻbīrāt-i ʻirfānī* [*The Glossary of Mystical Terms and Expressions*], Tehran: Ṭahūrī Library.

Utas, B. (1973), *Ṭarīq ut-taḥqīq. A Sufi Mathnawī Ascribed to Ḥakīm Sanāʼī of Ghazna and Probably Composed by Aḥmad b. al-Ḥasan b Muḥammad an-Naxčavānī.* A critical edition, with a history of the text and a commentary, Lund: Studentlitteratur.

Illustrations

Fig. 1. Hierarchical clustering of works written in *hazaj* and *khafīf*.
Fig. 2. Distinctive words for two meters.
Fig. 3. Verification results for ʻIrāqī, *Dīwān* ("Book of Love" is excluded).
Fig. 4. Verification results for Sanāʼī ("Book of Love" is excluded).
Fig. 5. Verification results for *ʻIshq-nāme* as a target text.
Fig. 6. "Unmasking" of *ʻIshq-nāme* against the behaviour of "true" Sanāʼī texts. Lines show average distances from Sanāʼī (sample A): the closest line is Sanāʼī (sample B), dark grey dotted lines of true "other authors" form two groups, black solid line shows the behaviour of *ʻIshq-nāme*.

DOI: 10.31250/1238-5018-2021-27-2-53-62 Received by the Editorial Board: 13.08.2021