# International Conference on the Voynich Manuscript 2022

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## Abstract

The International Conference on the Voynich Manuscript, which took place 30 November and 1 December 2022, was the first peer-reviewed conference that was dedicated entirely to the Voynich MS. The only similar event took place ten years earlier at Villa Mondragone, Frascati, Italy, with invited presentations but without published proceedings (Schmeh, 2013). This paper summarises the event, its preparation and organisation, with a summary of the papers that were presented and potential avenues for further research.

## 1  Introduction

The Voynich Manuscript is an enigmatic medieval mystery. It is (widely believed) to be a 15th century tome which is written in a unknown script, in an unknown language whose contents, despite the efforts of many experts over the last century, has yet to be deciphered. Within its pages lie fantastical figures and illustrations of plants (many unidentified as of yet, if they exit at all) and people, in addition to drawings of an astronomical nature, that baffle interpretation. This conference, and the research presented, is a reflection of the continued interest in this manuscript and the ongoing efforts to unravel its mysteries (or, determine if there is a mystery at all, it may also be a hoax). A good starting point for anyone interested in gaining more knowledge on the manuscript in general is René Zandbergen's informative website on the topic, http://www.voynich.nu.

The informal group of researchers that make up the "Voynich Research Group" had their first meeting in May 2019. At that point participants were Michael Rosner, Lonneke van der Plais and Colin Layfield at the University of Malta: a group of academics who had a common interest in the mystery that is the Voynich Manuscript. In 2020 John Abela joined our group and it grew further, as the need for additional outside expertise was apparent. The initial members were from the fields of Artificial Intelligence and Computational Linguistics, but proper Voynich research would need historical and mediaeval studies expertise too. René Zandbergen, Lisa Fagin Davis and Claire Bowern joined the group in the period 2020–2021.

The idea of a conference on the Voynich Manuscript was first proposed in September of 2021. It was agreed this would be an interesting venture and an opportunity to see what the larger Voynich community has been working on, and that an online format was the most appropriate due to the uncertainty around the COVID-19 global situation at the time.[1] The review process used a 2 phase double blind process where 3 reviewers (who would not know who the submitting author(s) were) would be assigned to each paper, initially reviewing an abstract. If this passed the first review, the author(s) would be invited to submit a full paper where the same reviewers would

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[1] As an aside, the VM has a tenuous link with Malta due to the fact it is believed that Father Strickland (a Jesuit priest from Malta) acted as some sort of intermediary between the Jesuits of Villa Mondragone and Voynich himself resulting in the purchase of the VM.

subject it to a second review and, if successful, the author(s) would be invited to participate in the conference to present their work.

The call for papers generated a total of 32 submissions. At the end of the process 16 papers were selected for admission to the conference. They covered a wide spectrum of topics and approaches to investigating the Voynich, which we will explore below. The conference also had two well respected keynote speakers: René Zandbergen opening the proceedings and Lisa Fagin Davis closing the conference, in addition to the welcome presence of Ray Clemens, curator at the Beinecke Library at Yale where the Voynich is preserved as MS 408, who opened the conference with a few words.

The conference covered two half days, allowing convenient attendance from East Asia (evening times) to the US West Coast (early morning times). Times listed in this paper are in Central European Time. Each day was split into two sessions of four presentations each. All selected presentations were pre-recorded on video, thus ensuring that the programme was followed precisely according to the planned timeline.

The following sections will explore the presentations at the conference and the insights they have offered. The papers are all available online at the conference proceedings website[2] (Layfield and Abela, 2022). All of the presentations were pre-record and the videos of the paper presentations can be found on our YouTube channel[3].

## 2 Conference Presentations

The following sections provide a summary of the papers presented at the conference, organized by session.

### 2.1 The Keynote Presentations

In his opening keynote, *Transliteration of the Voynich MS text*, René Zandbergen outlined both old and new aspects of the data that is used as input in all studies of the MS text. After a brief historical introduction, he indicated issues with the accuracy of existing transliterations, and introduced new representation formats and tools that facilitate the handling of these data. This included in particular a new transliteration alphabet that combines all features of the existing alphabets, and al-

lows direct comparison of all existing transliterations (Zandbergen, 2022).

In her closing keynote, *Voynich Paleography*, Lisa Fagin Davis demonstrated how the principles of Latin Paleography may be profitably applied to the Voynichese writing system, resulting in the identification of distinctive features of five scribes. In addition, she suggested that several symbols may be abbreviations or ligatures and proposed how to interpret these as such (Davis, 2022).

### 2.2 Session One, 30 November 2022, 14:15 – 16:15

The first session of the conference had an eclectic mix of papers. The topics discussed included; a comparison of the Voynich to Sloane MS 3188 (Enochian constructed language), the interpretation of the tent-like illustrations in the Voynich, the role that the gynaecological and sexological content in the Voynich played in the (possible) encipherment of the manuscript, and whether it can be argued that the Voynich is too non-random to be gibberish (Boxer, 2022).

The first paper of the session, *Fingerprinting Gibberish: A Quantitative Comparison of the Voynich and Sloane MS 3188*, by Alexander Boxer, examines the Enochian test of the Sloane MS 3188 to the VM. Sloane MS 3188 is an important corpus of gibberish text that is just over a hundred years younger than the VM. In the course of his work, the author also created, and made freely available, a new transcription of the Voynich and, using the new transcription, compared the VM to the Sloane MS 3188. The author concluded that, although there are a number of qualitative similarities between the two manuscripts there are also substantial statistical differences and even if both manuscripts are gibberish they do not belong to the same type of gibberish (Gheuens and Rapaport, 2022).

The second paper, *Above and Beyond Voynich Canopies: Tents as a Recurring Motif in Beinecke MS 408*, by Koen Gheuens and Cary Rapaport, investigated the presence, and possible interpretation, of a recurring motif of tent-like structures (or canopies). The authors compared two groups of tent-like structures from different sections of the manuscript and compared them to those in contemporary mediaeval images. The authors hypothesised that the tent-like structures in the VM were likely inspired by tensile architecture from the pe-

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riod. They also argued that Voynich tent images incorporate the visual metaphor of the sky as a tent and emphasised that this symbolic aspect is important for understanding what these images represented to a mediaeval audience.

In the third paper, *'I beg your grace that you suppress this chapter or else allow it to be written in secret letters': The emotions of encipherment in late-medieval gynaecology*, by Keagan Brewer investigated the emotions involved in late-medieval gynaecology and sexology. In particular, Brewer argued that many of the illustrations in the VM cross mediaeval lines of taboo and that concerns about certain taboo subjects may have served as motivation for the encipherment of the VM. The paper makes several references to examples of encipherment, erasure, and self-censorship in gynaecological and sexological texts of the period (Brewer, 2022).

The final paper of Session One, *Gibberish after all? Voynichese is statistically similar to human-produced samples of meaningless text*, by Daniel E. Gaskell and Claire L. Bowern, argued that gibberish text does not have to be (statistically) random. If the Voynich manuscript indeed contains only gibberish then it may not have been produced by a random process but by some methods that created meaningless text that was meant to look like natural language. The authors recruited 42 volunteers to write gibberish text and compared the resulting text against the VM and linguistically meaningful texts. The authors argued that the results obtained refute the idea that the low-level structure of the VM is too non-random to be meaningless (Gaskell and Bowern, 2022).

## 2.3 Session Two, 30 November 2022, 16:15 – 18:15

Two of the four papers in session two addressed the possibility that the VM is an encrypted text whose statistical properties may be different from the original plain text. The other two respectively focused on whether computational linguistic techniques applied to VM can validly reveal insights concerning, its authorship, or its linguistic structure. The order of presentation in the programme did not exactly follow these thematic groupings, as indicated explicitly below.

Opinions differ about whether VM is an enciphered natural language or whether it is gibberish. Its predictability at character level is often cited as support for the latter argument. However, this argument assumes that unusual predictability at character level implies that the text as a whole is gibberish because it lacks the kind of higher-level structure that characterises meaning-bearing language. *Enciphered after all? Word-level text metrics are compatible with some types of encipherment* by Claire Bowern and Daniel Gaskell (second paper of session) pours some doubt on this argument by asking whether ciphers exist that produce the textual characteristics that make Voynichese unusual at the character level, whilst preserving higher level topic structure across larger segments of text. To investigate this, 22 methods of textual manipulation were unleashed on samples of genuine historical and contemporary NL text and the results were compared, using a similarity metric based on statistical properties, with VM, and with the output of a gibberish construction method. The textual manipulations indeed produced a range of effects on the similarity measurements. Several produced outcomes that are similar to Voynich text according to at least some metrics, whilst showing differences according to others. The authors concluded that the unusual word-level predictability highlighted in previous work is not conclusive evidence that the Voynich manuscript is gibberish (Bowern and Gaskell, 2022).

*Polygraphia III: The cipher that pretends to be an artificial language* by Jürgen Hermes (third paper of session) provided additional evidence in this vein by examining a historical example. A cipher where individual letters are replaced with invented words that are very similar to each other has the potential to generate text whose statistical properties (using joint entropy, distribution of word length and similar words), are very similar to those of Voynichese. This kind of cipher is found in the first printed book on cryptology, namely the Polygraphia written by Johannes Trithemius (Trithemius, 1518), who described procedures based on the fact that the letters of the plain text occur at specified positions of the cipher text, the rest being filled with nulls. The creator of the message must generate an extremely large amount of inconspicuous text, and Polygraphia III was the third of a series of refinements to the original idea which reduced the effort by exploiting the fact that many similar words have the same stem (Hermes, 2022).

*Demystifying the scribes behind the Voynich Manuscript using Computational Linguistic Techniques* by Kevin Farrugia, Colin Layfield and Lonneke van der Plas (first paper of the session) attempted to provide a computational validation of Lisa Fagin Davis' hypothesis, based on established palaeographic techniques, that the VM is the work of five different scribes. This is achieved using machine learning to train several classifiers based on character sequences using Davis' original classification as a gold standard. Training was performed on 90% of the corpus, and testing on the remaining 10%, repeating the exercise for different splits of the corpus (10-fold cross validation). The authors concluded that there was a reasonable overlap between the classifier predictions and the ground truth taken from palaeographic work. However there were also some anomalies (e.g. cases where "all classifiers agreed with one another but not with Dr Davis") suggesting that further research would be necessary to perfect the choice of data upon which classification is made (Farrugia et al., 2022).

In *An Analysis of the Relationship between Words within the Voynich Manuscript* Andrew Caruana, Colin Layfield and John Abela (fourth paper of the session) investigated the presence of linguistic structure within VM by analysing various properties of word-pairs found in the manuscript as well as in other works written in natural languages such as the Bible, Dante's *La Divina Commedia*, and Shakespeare's *Macbeth* and *Julius Caesar*. An analysis of the order of words in the word-pairs indicated many 'skewed pairs' whose words were more likely to appear in one order than the other. The ratio of the number of skewed pairs to all pairs in each work was plotted, along with the same ratio for random shuffles of each work. The results indicated that there was a substantial difference in all natural language documents between their normal and shuffled counterparts. The difference was not as large within the Voynich Manuscript but the word-pair occurrence ratio of the original was still considerably higher than the ratio of the shuffled manuscript. The authors concluded that this could indicate that the Voynich Manuscript is not random text but may be a language or a cipher (Caruana et al., 2022).

An overarching theme underlying all but the last paper is the enduring debate on whether VM is gibberish. Unsurprisingly, the question was not conclusively answered but during the session some light was shed on the extent to which, paradoxically, ciphers of meaningful text can display surface properties that resemble gibberish.

## 2.4  Session Three, 1 December 2022, 13:00 – 15:00

Session Three had a mix of papers focusing on word-level statistical characteristics, transliteration alphabets, analysis of the script and the positional distribution of glyphs.

The first paper of the session was entitled *Crux of the MATTR: Voynichese Morphological Complexity* by Luke Lindemann. It uses two carefully validated word distribution statistics, the Moving Average Type-Token Ratio (MATTR) and the Most Common Words percentage (MCW) to determine the morphological complexity of the VM compared to an extensive set of languages from different families: 311 languages from 38 families. The results suggest that the VM is more complex than the average for Germanic and Romance languages and less complex than Semitic and Slavic (Lindemann, 2022).

The second paper in the session had the title *A new transliteration alphabet brings new evidence of word structure and multiple languages in the Voynich manuscript* by Massimiliano Zattera. This paper focuses on regularities that can be found in sequences of VM glyphs and proposes a so-called slot alphabet that is subject to a number of constraints. The majority of tokens can be decomposed in such slots. An algorithm is used to create a formal grammar for the word types in the VM which is subsequently used to classify sections of the text successfully (Zattera, 2022).

*Examining the history of VM glyphs using phylogenetic methods* by Katie Painter and Claire Bowern proposed a method based on phylogenetic networks on paleographic features (ten glyphs) to identify manuscript hand clusters. The method is first validated on known manuscript traditions. All the VM hands cluster closely together. The VM groups closest to the Uncial tradition, because of the absence of serifs and the relative lack of use of ligatures. However, in shape characteristics it is closest to Beneventan hands (Painter and Bowern, 2022).

The paper *Rightward and Downward Grapheme Distributions in the Voynich Manuscript* by Patrick Feaster proposed a

systematic approach for detecting positional distributions of words and glyphs within lines and paragraphs in terms of "rightwardness" (distance towards the right end of a line) and "downwardness" (distance towards the bottom of a paragraph). The paper provides three examples of possible graphemic minimal word pairs, for example those containing [k] and [t], to show the nature of these patterns (Feaster, 2022).

## 2.5  Session Four, 1 December 2022, 15:00 – 17:00

The four papers in session 4 are divided between properties of the text, how the Voynich Manuscript fits in a typology of encrypted book-length works, and two papers examining ownership of the manuscript.

*Seven Habits of Highly Eccentric Paragraphs* by Tavi Stafford focuses on the ways in which the gallows glyphs[4] are distributed across words, lines, and paragraphs in ways that do not resemble letters in alphabetic text. Stafford's observations, along with Feaster's and Zattera's in other sessions, provide some insight into the structure of Voynich text and how word structure may help us understand the document's composition (Stafford, 2022).

Comparison of composition is also the focus of *The Voynich Manuscript Compared with Other Encrypted Books* by Klaus Schmeh and Elonka Dunin; they report on preliminary results of a corpus of enciphered books, examining their purpose of creation, authorship, and other features. Based on comparison with 118 encrypted books created between the 15th Century and the present, they argue that the Voynich manuscript is not a diary, and most resembles a book of knowledge. They also point out that the great majority of similar books have a single author. However, few conclusions can be drawn with certainty (Schmeh and Dunin, 2022).

*From Voynich to the Beinecke, the Trail of Ownership* by Farley Katz presents newly found archival documents and traces the path of ownership of the Voynich manuscript from the time of Voynich's death (in 1930) to its donation by H.P. Kraus to Yale's Beinecke Library in 1969. Working from Wilfrid and Ethel Voynich's wills, through documents related to Anne Nill's sale to Kraus' donation, he is able to correct existing on-line and printed summaries of these events (Katz, 2022).

*Book transactions of Emperor Rudolf II 1576-1612. New findings on the earliest ownership of the Voynich manuscript* by Stefan Guzy traces the opposite end of the Voynich chronology. Following up on a lead originally suggested[5] by René Zandbergen, Guzy presents his newly discovered evidence for how the Voynich manuscript arrived into the collection of Emperor Rudolf II. The paper provides evidence for the bill of sale of a small number of 'unusual books' from the Augsburg physician Karl Widemann. This sale took place in 1599 and the amount paid by Rudolf was 600 florins. Some suggestions are provided for where Widemann may have obtained the manuscript (Guzy, 2022).

## 3  Conclusions and outlook

A survey taken after the conference clearly indicates that it was a successful event. There were 75 registered attendees for the conference who actively participated in the question periods following each talk.

The main takeaways from the presentations may be summarised as follows:

1. New and better information about the physical manuscript: its provenance in the 20th Century and details about its immediate history pre-Yale, as well as more information about the circumstances under which it may have ended up in Rudolph II's court. Tracing the sale (as well as the likely source) provides new clues for further establishing the location of the Voynich Manuscript between its creation and its arrival in Prague.

2. New work on the features of the text and script, although some conclusions are more subjective than others. A recurring theme throughout the conference was the identification of patterns above the level of individual words and what they might suggest about the circumstances of composition.

3. New—but still not entirely conclusive—work on the question of whether the contents are enciphered or meaningless. Both arguments have merit and make testable predictions, particularly in light of the focus that several

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papers had on the page structure's correlation with glyph distribution.

4. Some work on imagery was presented, although this is an area in which more research and comparative work would be welcome, especially in the light of the increasing availability of digital manuscripts.

There is an interest in repeating this event, possibly every two or three years.

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