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Modelling Chinese contemporary calligraphy: the WRITE data model

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Abstract

This article presents the WRITE data model and dataset, a comprehensive collection of Chinese contemporary calligraphic data, utilizing Linked Open Data (LOD) principles. Calligraphy plays a pivotal role in Chinese culture, reflecting national identity and cultural transformations. The objective of this study is to enhance understanding and provide new tools for exploring Chinese contemporary calligraphy through LOD. The WRITE data model comprises artistic, linguistic, and socio-political-economic aspects. The WRITE data model, developed collaboratively with domain specialists, represents four collections: Contemporary Visual Art, Performance, Graffiti, and Decorative and Applied Arts. Metadata describing the artworks is structured by reusing and extending the Wikidata model. Complex relations are established between artworks and contextual elements, (e.g. people, exhibition history, organizations, and literary works). The artistic and linguistic metadata recorded over the 'calli-writing units' provide insights into shared and diverging characteristics with traditional calligraphy. Traditional and contemporary calligraphy practices are compared, highlighting how contemporary calligraphy challenges traditional rules. Two case studies demonstrate the formalization of specific items in the WRITE collection, showcasing the study of graffiti art's socio-political meaning in China and the multidimensional nature of musicalligraphy performance. The WRITE dataset and data model contribute to advancing knowledge and understanding of Chinese contemporary calligraphy, offering valuable resources for artistic analysis and interdisciplinary research.

Keywords: Linked Open Data, calligraphy, contemporary art, digital archive, performance, graffiti,

1. Introduction

Calligraphy has always been the 'chief of all Chinese arts' (Chiang 1973) and a central tenet of Chinese civilization: it is closely connected with the notion of national, cultural and personal identity (Li 2009; Pellat et al., 2014) and its history is strictly linked with the whole history of China (Ouyang and Fong 2008). The emergence of new elements in the powerful and extremely coherent tradition of the calligraphic practice has always been an indicator of ongoing cultural changes (Kraus 1991; Schlombs 1998; Harrist and Fong 1999) so calligraphy can be seen as a reflecting mirror through which we can observe and understand Chinese culture as a whole. Today, calligraphy is still extremely pervasive in Chinese society (Yen 2005; Vermeeren 2020) and, recently, lots of new forms of calligraphy have emerged (in all fields of visual and performing arts) as it has never happened before (Iezzi 2013). 'WRITE' ERC funded project^{1,2} is the first systematic analysis of all these new art forms. Creating the first artworks dataset of these new forms of calligraphy and using a media-based categorization, WRITE will investigate the emergence of these new forms of calligraphy across four collections: (1) 'fine and contemporary arts',³ (2) decorative and applied arts, (3) performing arts, and (4) graffiti art.

This contribution focuses on the development of a data model utilizing Linked Open Data (LOD) to enhance scholarly knowledge and provide innovative tools for a comprehensive exploration of Chinese contemporary calligraphy. Employing the WRITE data model, the WRITE dataset collects, structures, and preserves the multifaceted domain of Chinese contemporary calligraphic data. The analysis of the artworks collected in the dataset is a multilayered analysis that involves three main levels:

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 Artistic analysis: formal, stylistic, and iconographic examination of collected artworks;

- Linguistic analysis, which means an analysis of the artworks' texts (transcription, identification of language, author, text type and genre, meaning, text history, translation);
- Socio-political-economic analysis, which means an analysis of the client/patron (public or private), public response, exhibition history, and economic value of the artworks.

WRITE examines the innovative ways in which these new forms of calligraphy have responded to, subverted or reinterpreted traditional idioms to define if and how they create a modern artistic identity that exists comfortably within the global art world while remaining indelibly Chinese (Barrass 2002; Liu, 2010; Iezzi 2015). The combined analysis of these three levels will establish the intricate network of connections between the collected artworks and different aspects of Chinese contemporary culture.

In detail, the article is structured as follows: Section 2 examines LOD data models in CH and Chinese cultural production. Section 3 presents the methodology used in the WRITE data model. In Section 4, the data model and two case studies are introduced. Section 4 concludes the article by summarizing the research findings.

2. State of the art

LOD has nowadays been a standard in the GLAM domain to increase the value and discoverability of metadata, fostering reuse, and alignment from and to external sources. A growing interest has been expressed towards Chinese assets, including traditional and contemporary calligraphy, by outstanding LOD datasets such as the Pagode Project in Europeana (Bachi et al., 2021), Rijks Museum (Dijkshoorn et al., 2018) and the British Museum. 4 However, they primarily offer general descriptive metadata without in-depth scholarly analysis. For example, the painting 'Flying White' by Zhang Dawo 張大我 is listed in the British Museum catalogue.⁵ General descriptive metadata is captured in designated fields (e.g. author, title), but information regarding depictions, calligraphy, and technique is only found in a free text section.6

Many conceptual models have been designed to represent the CH domain, for instance, Europeana Data Model (EDM) (Charles and Isaac 2015), Wikidata (Erxleben et al., 2014), CIDOC CRM (Doerr, Ore, and Stead 2007), and FRBRoo (Bekiari et al., 2015). In addition to factual metadata, these models expand the representation to encompass new forms of

scholarly analysis, such as linguistic/textual and artistic analysis, at a general level.

Currently, some data models have been developed to specialize the formalization of scholarly analysis of CH artefacts adopting different perspectives, such as scientific observations (Doerr et al., 2023), hermeneutics (Daquino et al., 2020), artistic and iconographical analysis (Carboni and De Livio 2019; Sartini et al., 2023) and textual analysis of ancient documents (Felicetti and Murano 2021).

Even if the literature on LOD and CH ontologies is extremely rich, the attempt to work on Chinese tradition and implications, not just on cultural artefacts, through a scholarly-oriented approach is something that lacks and it represents the added value of this research.

3. Methodology

The methodology adopted in this work focuses on the cooperative design and development of a data model leveraging Semantic Web technologies. The data model represents and captures underlying patterns and relationships within the phenomenon of Chinese contemporary calligraphy artistic production investigated by the WRITE project through the creation of a dataset built on the data model. The data model has been designed to suit the description of complex and heterogeneous cultural objects belonging to the WRITE dataset. Given that these objects are carriers of cultural value from a historic-artistic point of view, the data model brings forward their artistic character. It also allows for a future in-depth linguistic analysis of their textual content. Starting from these notions, the data model helps emerge the potential socio-political repercussions brought by the description of these cultural objects.

The methodology foresees the identification and formal abstract conceptualization of the representational requirements across the three levels of analysis (artistic, linguistic, and socio-political analysis) for the four WRITE collections ('fine and contemporary arts', decorative and applied arts, performing arts, and graffiti art).

As far as the conceptual model is concerned, the descriptive metadata of the artworks, along with general information about their history in the collection, is represented using a subset of the extensive vocabulary provided in the Wikidata model (Erxleben et al., 2014). Reusing Wikidata classes and properties guarantees interoperability and interchange by employing a well-known, general-purpose data model. Moreover, the Wikidata model served as a straightforward and intuitive solution for non-IT experts facilitating the

collaborative participation of annotators in the data modelling activity.

The Wikidata model incorporates specific information relevant to the WRITE domain. It offers a rich selection of classes and properties for describing cultural objects and the WRITE data model reuses the ones that cover cultural objects' environment in a generic manner, such as persons, events, actions, dates, places, etc. However, considering the lack of existing ontologies that adequately represent the artistic and linguistic aspects of calligraphy, it was necessary to create a dedicated WRITE ontology that would be able to describe the particulars of these cultural objects, as the calligrapher, the presence of the 'calli-writing unit' and its various specifics such as calligraphic lines, forms of used characters, writing systems, etc.

The adopted methodology aligns with the principles and technologies of the Semantic Web, given that the state of the art within the Cultural Heritage field suggests the need for employing these technologies to overcome the interoperability barrier, against data silos, and obtain harmonious interchange of the vast variety of Cultural Heritage data (Bikakis et al., 2021). To that end, the project follows both LOD and FAIR (Findability, Accessibility, Interoperability, and Reuse) principles with the scope of being introduced into the Knowledge Graph.

Therefore, an instance of OmekaS (Li 2020) has been deployed to enable collaborative data entry, equipped with the WRITE data model integrated with the Wikidata model to store WRITE metadata and media. The document-centric approach adopted by the Wikidata model complemented OmekaS templates effectively, streamlining the data entry process and reducing its complexity. The data entry process allowed us to evaluate the representativeness and accuracy of the WRITE data model. Currently, the WRITE archive

is still being populated and consists of 390 items, including 140 artworks.⁸

4. The model

WRITE data model primarily focuses on the representation of four collections: Visual Artworks (wd: Q4502142), Performance (wd: Q213156), Graffiti (wd: Q17514), and Decorative and Applied Arts (write: DecorativeAndAppliedArt), as depicted in Fig. 1.

Artistic analysis of these artworks is conveyed through various metadata that describe the artistic characteristics and value of the pieces, such as their type, subject, physical dimensions, materials they are made of, fabrication methods and colours used, and others, mostly represented via Wikidata properties.

However, the model tackles the artistic nature not only of the artworks, but also of their integral parts, identified as 'calli-writing units'. These units should be considered as sections of the artwork presenting that contain some kind of calligraphy. The choice of to identify them as 'calli-writing units' is non-trivial, given that contemporary calligraphy stretches the rules and boundaries of traditional calligraphy (Zhang 1998; Pu and Guo 2005; Wang 2005). Considering the reshaping process of traditional calligraphy in modern production (Barrass 2002; Iezzi 2015), such units cannot be categorized as calligraphy as an a priori assumption.

Besides the artistic analysis, the model incorporates the possibility of conducting the linguistic and textual analysis over these 'calli-writing units'. Linguistic metadata are recorded to classify shared and diverging characteristics with traditional calligraphy (see Fig. 2), focusing on stylistic and semantic characteristics. Hence, the model provides information about linguistic particulars of the 'calli-writing units', such as

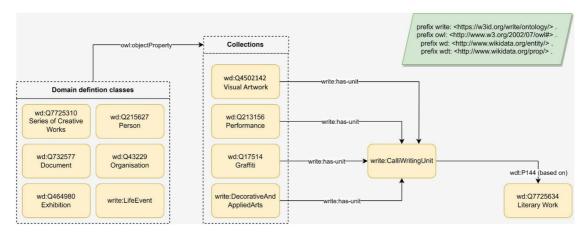


Figure 1. A summary of the WRITE data model.

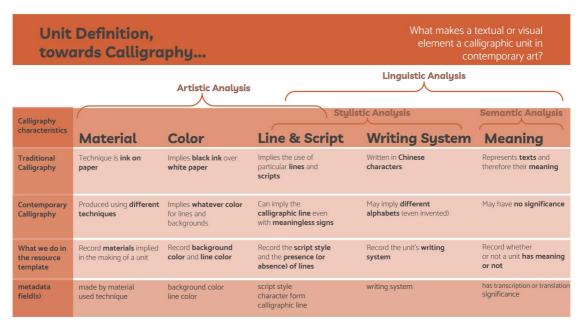


Figure 2. Table of comparison between traditional and contemporary calligraphy practices.

writing systems, character forms, script style, both the transcription and the translation of what is represented within the unit, etc.

Additionally, the influence that traditional literary production has on contemporary calligraphy is represented through the relation between 'cally-writing units' and literary works (wd: Q7725634, Literary work) via the Wikidata property based on (wdt: P144). It was important to offer these specifications through the model considering that one of the main research questions of the WRITE project regards the inquiry about how contemporary calligraphy subverted the traditional rules in creative ways (e.g. Can contemporary calligraphy still be considered calligraphy?) (Iezzi 2013).

Contextual elements constitute a necessary step for understanding the broader socio-political aspect of contemporary calligraphy production. Thus, the model stores information about various organizations (wd: Q43229) and people (wd: Q215627) involved in the creation and dissemination of the artworks, the main life events of their creators (write: LifeEvent), the data on different exhibitions (wd: Q464980) where the artworks were displayed, as well as the series these artworks belong to (wd: Q7725310).

The overall model allows for a complete representation of the heterogeneous artworks of the four WRITE collections allowing for further in-depth analysis under the light of the artistic, linguistic and socio-political lens of analysis. For example, WRITE data model can represent a typical scenario where a creator, during an event arranged by an organization in a specific place

and time, with the help of an artwork produces another artwork that contains a complex artistic-linguistic unit. Given the miscellaneous nature of the four collections, it is important to notice that the three analyses represented by the model are not necessarily applicable to every artwork and its environment.

Two case studies are therefore provided by showing the formalization of two items in the WRITE collection: the graffiti piece *Shirupozhu* (*With Irresistible Force*) by Kwanyin Clan (belonging to class wd: Q17514, Graffiti), as an example of the study on graffiti art with a particular attention over the sociopolitical meaning of graffiti in China and the *Musicalligraphy Performance* by Luo Qi and Collegium Musicum Almae Matris (instance of the class wd: Q213156, Performance), as an example of complex multidimensional nature of performance and their physical products.

The project's technical documentation, including the data model description, the RDF data and the detailed description of the case studies mentioned above (including their graphical representation), can be found at https://write-dataset.github.io/documentation/.

4.1 Case Study 1

The first case study concerns a graffiti piece imbued with calligraphic implications. In contemporary Graffiti art, the traditional calligraphy rules are subverted, and the classical brush is replaced with a spray can. *Shirupozhu* (*With Irresistible Force*), shown in Fig. 3, is a graffiti piece made by the Kwanyin Clan in

2008. It was privately commissioned (wdt: P136) by the Nike brand (class Organization, wd: Q43229). The socio-political characterization of this artwork plays a central role in its definition (and in general, in the definition of the Graffiti art collection), therefore the information about the graffiti's genre (e.g., public socio-political art, institution commissioned art) is valuable for understanding the socio-political background of the artistic production.

In this graffiti piece, three 'calli-writing units' (write: has-unit; write: CalliWritingUnit) can be identified. The artistic and linguistic perspective can be analysed through the descriptive metadata provided for each 'calli-writing unit'. This artwork combines calligraphy and Chinese writing (write: writing-system) and mixes three graffiti styles (write: graffiti-style) wildstyle, 3D style, and tagging Fig. 3. Despite the three units have characteristics related to traditional calligraphy, such as their meaningful content (write: significance), the use of Chinese characters (write: writing-system) and calligraphic lines (write: calligraphic-line), such units contain several divergent elements from traditional practices. For instance, the 'calli-writing unit' CW1a is composed of the four characters of the title (shi ru po zhu 势如破竹). It is written using an aerosol spray can (wdt: P2079) on a white wall

(write: background-colour; wdt: P186, made by material), as opposed to traditional calligraphy typically written on paper using ink and brush. Also, the ink colours are red, black, and shades of grey (wdt: P462), differently from the traditional black ink colour.

Traditional literary influence still lingers in contemporary Graffiti production. The unit's CW1a literal meaning (property write: transcription-ortranslation) is 'Having a power to cut down a bamboo' and is a reference (wdt: P144, based on) to the Book of Jin (晋书) (wd: Q7725634, Literary work), composed by Fang Xuanling in 648.

While traditional calligraphers used to receive a formal education, the creators of the graffito are a crew of artists (write: organization-type) where only one of the members has non-specified calligraphic formation (write: calligraphic-formation), while for the others this information is still unknown.

Shirupozhu serves as an illustration of the intricate interplay between artistic, linguistic, and sociopolitical elements within the domain of contemporary calligraphy practices explored by the WRITE archive.

4.2 Case Study 2

Throughout Chinese history, there has been a profound connection between sound and calligraphy,

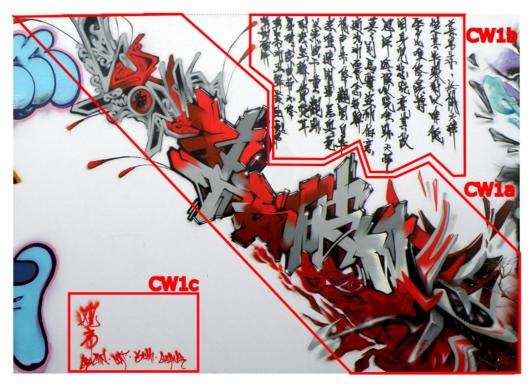


Figure 3. Kwanyin Clan (EricTin, Nat, Yumi, Quan), Shirupozhu 势如破竹 (With Irresistible Force), 4–6 February 2008, 6 × 6 m, spray paint on panel, Beijing, 798 Art District, Nike 706 Art Space. Courtesy of the artists. The marked fields serve as a graphic aid for individuation and a better understanding of the 'calli-writing units'.

revolving around the concept of harmony (Billeter 2001). As a central aspect of their creative concepts, contemporary calligraphers incorporate musical principles into their artistic expression and musicians use calligraphy as a muse for their musical compositions. In particular, 'musicalligraphy performances' call for simultaneous collaboration between calligraphers and musicians to create emotionally captivating public shows (Iezzi 2018).

The event Luo Qi and Collegium Musicum Almae Matris-Musicalligraphy Performance (class Performance, wd: Q213156) shown in Fig. 4 is a musicalligraphy (write: performance-art-type) held during the opening ceremony of the exhibition (wd: Q464980) entitled Luo Qi: Calligrafie musicali. 10 The performance gathered many agents in different roles (e.g. calligrapher, performer, musician, and organizer). During this performance, the calligrapher Luo Qi (wd: Q215627, Person), inspired by some famous Italian opera arias (write: song-title; write: music-style), was writing a set of calligraphic signs along a 20-m-long white paper scroll (wdt: P186, made by material), thus creating a new visual artwork (write: creates-artwork, instance of the class wd: 04502142). He also used a set of already-existing artworks (write: uses-artwork, instance of the class wd: Q4502142) as a support for this artistic production. All artworks produced and used during the performance are stored in the WRITE digital archive aiming to ensure a full representation of the phenomenon of performance art.

These artworks also incorporate 'calli-writing units' has-unit, class write: WritingUnit). Similarly to the first case study, these 'calli-writing units' share similarities and differences with traditional calligraphy. Interestingly, as shown in Fig. 4, CW2b presents meaningful writing (write: significance) written using running script (wdt: P9302) and traditional Chinese characters (write: writingsystem and write: character-form), respecting most traditional calligraphy practices even for what concerns materials and tools. Contrarily, CW2a records a notation in Dunhuang musical score system¹¹ (write: writing-system) as a set of signs (write: significance), where traditional characters have no specific form (write: character-form). The particularity of the CW2a is precisely this musical notation system, which is not usually used in calligraphy writing.

The calligrapher Luo Qi received both familial and academic formation of traditional calligraphy (write: calligraphic-formation).

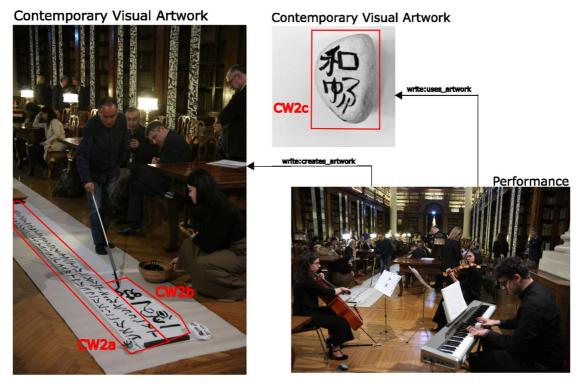


Figure 4. Luo Qi and the Collegium Musicum Almae Matris, musicalligraphy performance, opening ceremony of the exhibition 'Luo Qi: Calligrafie musicali', 25.03.2019, Bologna University Library. The marked fields serve only as a graphic aid for individuation and a better understanding of the 'calli-writing units'.

This musicalligraphy performance and its subsequent artistic production are a perfect example of a complex cultural entity stored and described by the WRITE data model. Despite being less significant for the sociopolitical analysis as the Case Study 1, it is highly valuable for the intricate artistic and linguistic analysis, considering the presence of different aspects, from the event to the artworks, people, places, literary works, etc.

5. Conclusion

This work utilizes LOD as a tool to investigate and analyse the phenomenon of Chinese contemporary calligraphy and its reinterpretation of traditional idioms, aiming to determine its contribution to the development of contemporary artistic identity.

The WRITE data model represents the interplay between three levels of analysis: artistic, linguistic, and socio-political, by analysing four diverse collections of artwork. This representation allows for the exploration of the intricate network of relationships between the collected artworks and various aspects of Chinese contemporary culture within the context of calligraphy. Leveraging the potential of the LOD environment, the WRITE data model facilitates multidisciplinary analysis of heterogeneous artworks. In particular, the two case studies discussed (cf. Section 4) exemplify how the WRITE model enables comprehensive analysis from three distinct perspectives. First, it facilitates artistic analysis of the artworks and their 'calli-writing units'. Second, it enables linguistic analysis of these units and their associated literary works. Lastly, it supports socio-political analysis by utilizing data about artists, organizations, and artworks.

For the domain experts, that is the Chinese experts members of the research team, the data model has been useful to face the content of the studied objects with a new analytical approach, exploring a non-conventional methodology for doing scholarly research. The formalization of Chinese contemporary calligraphy is therefore a new tool to reveal hidden links, and share patterns and diverging characteristics between contemporary and traditional calligraphy. Finally, the WRITE archive aims to enable users to explore innovative paths for reaching new knowledge about Chinese tradition by browsing data collection which adheres to FAIR principles.

Looking ahead, our plans involve completing the data entry process and publishing the archive, accompanied by custom visualizations that represent the three levels of analysis.

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Adriana Iezzi is responsible for writing the Introduction of this work. Katarina Lučić was

primarily responsible for the literature review, gathering relevant scholarly articles, and summarising the existing knowledge in the State of the art section. Valentina Pasqual contributed to the methodology design and data collection procedures outlined in the Methodology and together with Katarina Lučić is responsible for this section. Katarina Lučić and Valentina Pasqual wrote together the Model and case studies section. All authors synthesised and discussed the findings, drawing conclusions and implications in the Conclusion section. Martina Merenda and Marta Rosa Bisceglia together with Adriana Iezzi performed the data entry activity of the project. In particular, Martina Merenda curated the Performance Art collection, while Marta Rosa Bisceglia curated the Graffiti collection. Adriana Iezzi and Francesca Tomasi provided critical revisions and feedback throughout the writing process, ensuring the coherence and accuracy of the manuscript. All authors actively participated in the manuscript review, providing intellectual contributions and final approval for the submission.

Authors' contributions

Valentina Pasqual (Conceptualization, Data curation, Methodology, Software, Visualization, Writing—original draft, Writing—review & editing), Katarina Lučić (Data curation, Formal analysis, Methodology, Visualization, Writing—original draft, Writing—review & editing), Marta Rosa Bisceglia and Martina Merenda (Data curation and Resources), Adriana Iezzi (Funding acquisition, Project administration, Supervision, Writing—original draft), Francesca Tomasi (Conceptualization, Methodology, Supervision).

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Notes

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- 2. See https://writecalligraphyproject.eu/
- 3. 'Fine and contemporary arts' (or simply 'contemporary visual arts') is only a tentative label to include new forms of calligraphy (from the 80s until now) in the domain of the so called 'fine arts' (which means painting-like calligraphy, few characters calligraphy, abstract calligraphy, printmaking, seal carving, and

- sculpture) and 'contemporary arts' (which means assemblage, collage, mixed-media, conceptual art, installation, photography, digital art, videoart, and land-art).
- See https://www.britishmuseum.org/search?search_api_fulltext=chinese ±calligraphy
- https://www.britishmuseum.org/collection/object/A_1998-0210-0-4
- 6. The description field for describing the artwork is 'Calligraphy, made of ink on paper. The artist has used the "flying white" technique to create both elegant curves and lines; the white representing the dreamlike or transient'.
- 7. 'Data silos' refer to isolated or disconnected data collections within an organization, typically resulting from various teams (e.g., institutions, organizations, and research laboratories) using different systems, tools, or databases to store and manage their data. In this context, LOD provides a solution for integrating and connecting data.
- The complete documentation of the model can be found at https://write-dataset.github.io/documentation/
- 9. For the analysis of this graffito see: Iezzi 2019.
- English translation: 'Luo Qi: Writing Music'. For more information about this exhibition, see <u>Iezzi</u> (2020)
- 11. The Dunhuang musical score system is the oldest Chinese musical notation system. It has twenty symbols, or twenty simple characters, which represented the tablature notations for the five-stringed pipa (Chinese lute), indicating fingerings, tones, and notes. The symbols were transcribed one below the other from right to left, forming columns, exactly as if they were traditional characters within a written text. For more, see: Chen 1991.

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