

# Generative AI and Critical Pedagogy: Towards a Developed Methodology for *Zhuangzi* Studies in the Age of Algorithms

Anthea CHEUNG, Yanwen HOU & Yurong MA  
*Hong Kong Shue Yan University*

---

Recent developments in Artificial Intelligence (AI) have ushered in new research possibilities across nearly all disciplines, with varying degrees of effectiveness. This paper offers a test case of using AI in the humanities, a field traditionally rooted in qualitative analysis. The influential Daoist classic *Zhuangzi* has been chosen owing to its unique and subtle notion of *wuwei* (non-action). The authors have applied leading AI-aided databases such as Semantic Scholar, Elicit, and Scite to the vast amount of literature in the *Zhuangzi* study so that relevant research papers can be sifted through rapidly and key points highlighted can be analyzed and even summarized, offering an increasingly streamlined approach to the process of literature review (LR) and data curation. This is useful to both graduate and post-graduate students. However, our study discovered that the algorithm-driven nature of these platforms sometimes has overlooked and even misinterpreted the nuances of philosophical discourse regarding *wuwei* as found in the *Zhuangzi*. This is reflected in the contextual intricacies surrounding the text's political philosophy. According to the primitivist view of the *Zhuangzi*, the most salient feature of the polity of *wuwei* is not to be found in the paragraphs that address the term itself directly, but in the narrative of the illuminating or illustrious king (*mingwang*) in pursuit of a finely-tuned state of harmonious governance. Such subtleties have not been detected by the AI tools this study applied. Given this, a more advanced methodology capable of incorporating conventional *Zhuangzi* scholarship with textual analysis, historical understanding, and philosophical excursion proves necessary. That is to say, the supremacy of human intelligence cannot be dispensed with in the field of fine research in the AI era, especially for conventional philosophical topics of this kind.

---

## 1. Background

The advent of Artificial Intelligence (AI) has ushered in a new era of research possibilities across many disciplines (Kong, 2023). Humanities, traditionally considered a field rooted in deep qualitative analysis, has also begun to explore the potential of AI in augmenting its methodological approaches (Pavlidis 2022). Among the various sub-fields within humanities, the study of classical Chinese philosophy represents a rich and complex domain where AI's computational prowess can be harnessed to uncover new insights and understandings.

The *Zhuangzi* 莊子, one of the most influential pre-Qin Daoist classics, encapsulates a profound philosophical discourse that has been dissected through myriad lenses since its appearance. The interdisciplinary nexus of AI and the study of the *Zhuangzi* has the potential to foster novel methods that can contribute to a broader and deeper understanding of Zhuangzi's philosophical expositions, especially within the framework of Critical Pedagogy (Cooper, 2015) emphasizing transformative education and social justice.

The objective of this research paper is to bridge the huge gap between the traditional methodological approaches to the *Zhuangzi* and the emerging AI-driven methods within the framework of Critical Pedagogy. By demonstrating the possibilities and limitations of AI in the study of the composite work *Zhuangzi*, this research aims to contribute to a deeper understanding of classical Daoist philosophical concepts and the development of a more robust, integrative research methodology. The significance of this research lies in its attempt to harmonize traditional humanistic inquiry with present-day technological advancements. Such a synergy in the study of the *Zhuangzi* holds promise for a deeper, multi-dimensional analysis, opening up avenues for enhanced accessibility to and global discourse on classical Daoist philosophy. As an initial attempt, this paper intends to address primarily the following two questions: (1) How can AI accelerate the step of data mining for research in the contemporary period attempted on classical Daoist philosophical notions? (2) To what extent does generative AI help deepen the understanding of the rather intricate yet extremely inspiring political notion of *wuwei* 無為 (non-action) of the influential Daoist classic *Zhuangzi*?

## 2. Existing Methodologies in the Study of the *Zhuangzi*

The study of the *Zhuangzi* has a rich methodological tradition in China and beyond, adopting numerous approaches (e.g. literary, textual, historical, philosophical, religious, etc.) to explore the profound philosophical discourse embedded within the text (Cheung, 2010). A cornerstone of this has been traditional textual analysis, where scholars delve into the original text, employing philological and hermeneutic approaches to unearth the contextual meanings and philosophical underpinnings (Teubert, 2015). The encompassing nature of the *Zhuangzi* thought also attracts comparative studies (Chai, 2009 - as a telling example). Scholars would utilize a comparative methodology to draw parallels and contrasts between *Zhuangzi*'s philosophy and other philosophical traditions, both within and outside the Chinese context (Wang, 2021). Meanwhile, understanding the historical context in which the *Zhuangzi* was written is crucial for a well-rounded analysis. Engaging with the *Zhuangzi* on a philosophical level often involves a deep inquiry into the fundamental questions posed in the text, catalyzing dialogues within contemporary philosophical frameworks as well as traditional Chinese philosophical discourse (Liu, 2016).

In addition, the composite nature of the *Zhuangzi* text, thirty-two chapters divided into three parts (namely, the “Inner Chapters”, “Outer Chapters”, and “Miscellaneous Chapters”), has inspired interdisciplinary approaches, blending philosophical inquiry with literary analysis, religious studies, and even scientific discourse. In recent years, the emergence of Digital Humanities (DH) has marked a significant stride in studying the *Zhuangzi*. Scholars have begun utilizing computational tools for semantic mapping, network analysis, and to a lesser extent, textual analysis, providing fresh insights into understanding the *Zhuangzi* (Lin, 2012). Each of these methodologies brings a unique perspective to the *Zhuangzi*, contributing to the rich tapestry of interpretations and understandings of the text. The advent of AI represents a new turning point, offering an opportunity to augment these traditional methodologies and to explore new routes toward the hidden aspects of the *Zhuangzi*.

### **3. Implications of the AI Application in Humanities and Classical Studies**

#### **3.1 A Global Perspective**

The integration of AI into humanities and classical studies signifies a paradigm shift, opening up novel paths for research in this traditional research field. Globally, academic institutions and scholars have begun leveraging machine learning algorithms, natural language processing, and other AI technologies to delve deeper into textual corpora, uncovering patterns and insights that were previously unattainable or extremely time-consuming (Iqbal et al., 2020). For instance, AI-powered tools have facilitated the analysis of large datasets, enabling comparative studies across vast bodies of literature or historical records (Deshpande & Kumar, 2018; Ngwenyama & Rowe, 2024). Additionally, AI has enabled the development of semantic networks and topic modeling, aiding in exploring thematic trends and the interconnection of ideas across different cultures and periods (Chen et al., 2022; Boyd-Graber, Hu & Mimno, 2017). Furthermore, the global perspective of AI applications in humanities has fostered a collaborative ethos, transcending geographical and linguistic barriers. Digital platforms and AI-assisted databases have enabled scholars from different continents to engage with and contribute to a shared body of knowledge, enriching the discourse within classical studies including the domain of *Zhuangzi* studies (Liu, 2020).

#### **3.2 The Role of Critical Pedagogy in Technologically Driven Research**

Critical Pedagogy, with its roots in transformative education and social justice, offers a pertinent framework for evaluating the application of AI in humanities research. It advocates for a reflexive, dialogical approach toward knowledge construction, promoting a critical engagement with technological tools and methodologies (Panicker, 2020). In the context of technologically driven research, Critical Pedagogy challenges researchers to interrogate epistemological and ethical implications of AI applications, fostering a discourse that moves beyond mere technical efficiency to encompass social, cultural, and ideological considerations (Boyd & Crawford, 2012). The infusion of Critical Pedagogy into the AI-assisted *Zhuangzi* studies, for instance, prompts a thorough examination of how AI tools and algorithms may shape, constrain, or enhance the interpretative processes. It underscores the importance of maintaining a dialogical relationship between human scholars and AI technologies, ensuring that nuanced or context-rich analyses inherent in humanities research are not overshadowed by the application of AI that is in principle or nature heavily quantitative and data-driven.

### **4. Case Study**

The focal database for this study was the China National Knowledge Infrastructure (CNKI), which was selected due to its comprehensive repository of academic resources pivotal to Daoist studies in the Chinese language. Our access to CNKI was facilitated through institutional subscriptions from a curated selection of 8 universities, including mainland China and overseas regions. The institutions selected for this comparative study include (a) the University of Hong Kong, Hong Kong Shue Yan University, the University of Macau, the Hong Kong University of Science and Technology, and the Australian National University – representing the overseas cohort,

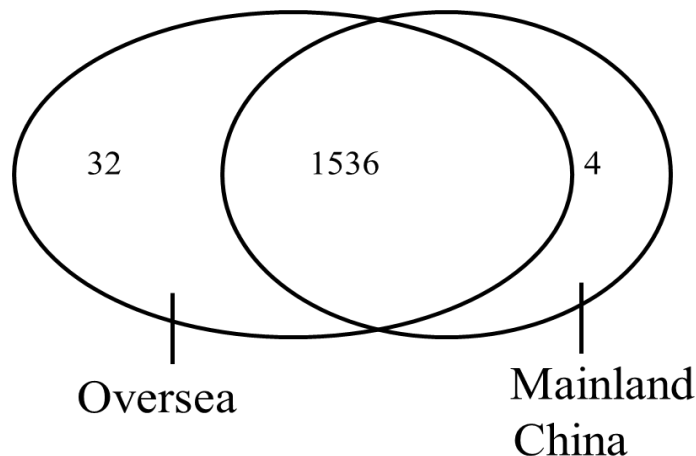
and (b) Fudan University, Sun Yat-sen University, and Fujian Normal University – representing the mainland China cohort. The data collection process was initiated by setting meticulous search parameters to identify all academic resources with the two key terms of “Zhuangzi” and “wuwei”, appearing in the title, keyword, or abstract. The data concerning the availability of these resources was diligently retrieved on a specified timepoint - 7 October 2023, to ensure a consistent basis for comparative analysis. It is observed that the findings being obtained (or the data collected) from the 5 overseas institutions were highly identical to the findings obtained from the institutions within mainland China, illustrating a consistency in database archives across similar geographical and institutional landscapes.

#### 4.1 Findings

The data collected was systematically tabulated to provide a clear juxtaposition between the number of archives available at institutions in mainland China and overseas, respectively. The tabulation revealed that overseas institutions had 1568 archives in total number, with 923 Academic Journals, 440 Theses/Dissertations, 20 Conferences, 32 Monographic Serials, and 153 Magazines. Conversely, mainland China institutions had 1540 archives, comprising 924 Academic Journals, 441 Theses/Dissertations, 19 Conferences, 32 Monographic Serials, and 124 Magazines.

A discerning analysis of the overlapping and unique results was conducted. There were 1536 overlapping results from the overseas and mainland China databases, indicating a substantial commonality in the academic resources available across the different geographical and institutional landscapes. However, 32 results were unique to the overseas database, while 4 were unique to the mainland China database, as illustrated in Figure 1. The pertinent information of these unique references is meticulously presented in Table 1.

Figure 1



**Table 1**

Numbers of Archives	Overseas	Mainland China
All (Chinese)	1568	1540
Academic Journals	923	924
Theses/Dissertations	440	441
Conferences	20	19
Monographic Serials	32	32
Magazines	153	124

The similarities and differences observed in the data provided above provide a detailed understanding of the global scholarly discourse on the *wuwei* notion of the *Zhuangzi*. The impressive level of academic engagement with “Zhuangzi” and “*wuwei*” across the different institutions is illustrated by the overlapping part of Figure 1. Conversely, the unique results of each geographical and institutional cohort potentially indicate differing scholarly focuses or resource availabilities.

## 4.2 Limitations

As we can see, the advancement of research databases heralds a promising era in the academic analysis of the *Zhuangzi*'s *wuwei*. The modern academic landscape has been substantially enriched by AI-powered tools designated to streamline the LR or the initial-stage research process. Tools like Semantic Scholar and Elicit employ advanced search engines to swiftly identify relevant papers, significantly reducing the time traditionally spent on manual searches. Moreover, tools like Concensus and Scite offer various benefits, including AI-powered searches, summarization of PDFs, extraction of key information, and citation analysis, which further aid in scientific research and enhance the efficiency and precision of academic endeavors. A notable limitation shown in the database is its inadequacy in handling Chinese research articles with AI-assist tools. While electronic platforms like CNKI can provide a robust repository for Chinese research articles, AI-assist tools like Scite and Semantic Scholar may fall short of AI generative results from research articles published in the Chinese language. This limitation poses a challenge for researchers to delve into Chinese philosophical texts or any other Chinese scholarly works using AI-powered tools that are not tailor-made to process Chinese language texts efficiently. The discrepancy in database search capabilities across different geographical and linguistic landscapes hence underscores a critical area for improvement. There is an urgent need to enhance the multilingual processing capabilities of AI-assist tools to ensure a more inclusive search functionality across a diverse spectrum of academic literature, encapsulating texts written in both English and non-English (for our case study, the Chinese language).

#### 4.2.1. The Semantic Complexity of *wuwei*: A Case for Human-Centric Analysis

The exploration of the political philosophy of the *Zhuangzi* would invariably involve examining core Daoist concepts such as *wuwei*. The semantic richness of *wuwei* poses significant challenges for AI-driven analysis nevertheless. The composite nature of the *Zhuangzi* text and the multi-dimensional, contextual interpretations associated with *wuwei* demand a human-centric analytical approach. While the prowess of AI can expedite the data collection process and preliminary analysis, the depth of understanding and interpretative insights necessitated for a comprehensive exploration of *wuwei* primarily reside in the human domain of intellectual engagement. The juxtaposition of AI and human analysis in this regard highlights a symbiotic relationship where the computational capabilities of AI are harmonized with the intuitive, experiential understanding of human scholars to foster a deeper exploration of the philosophical aspect of the *Zhuangzi*.

In fact, according to the perennial study of the first author on the *Zhuangzi* (Zhang, 2007; Cheung 2010; Zhang, 2024), there are three types or forms of *wuwei* inside the composite work *Zhuangzi*, representing three different orientations, namely, personal, political, and philosophical. The third one is the most fundamental, which, most likely, represents the ideal form of harmonious governance advocated by Zhuang Zhou 莊周 (a. 375-295 BCE, commonly called “Zhuangzi”), the second most influential master of the Daoist school besides Laozi (or Lao Dan). In the front part of Chapter 7 (“Responses to inquiries on how to be fit for emperors and kings” 應帝王 from “the Inner Chapters”) of the *Zhuangzi*, it is so written:

Jian Wu went to see the madman Jie Yu. Jie Yu said, “What was Zhong Shi telling you the other day?” Jian Wu said, “He told me that the ruler of men should devise his own principles, standards, ceremonies, and regulations, and then there will be no one who will fail to obey him and be transformed by them.” The madman Jie Yu said, “This is bogus virtue! To try to govern the world like this is like trying to walk the ocean, to drill through a river, or to make a mosquito shoulder a mountain! When the sage governs, does he govern what is on the outside? He makes sure of himself first, and then he acts. He makes absolutely certain that things can do what they are supposed to do, that is all. ...

Yangzi Ju went to see Lao Dan and said, “Here is a man swift as an echo, strong as a beam, with a wonderfully clear understanding of the principles of things, studying the Way without ever letting up - a man like this could compare with an illuminating king, couldn't he?” Lao Dan said, “In comparison with the sage, a man like this is a drudging slave, a craftsman bound to his calling, wearing out his body, grieving his mind. They say it is the beautiful markings of the tiger and the leopard that call out the hunters, the nimbleness of the monkey and the ability of the dog to catch rats that make them end up chained. A man like this - how could he compare with an enlightened king?” Yangzi Ju, much taken aback, said, “May I venture to ask about the government of the enlightened king?” Lao Dan said, “The government of the illuminating king? His achievements blanket the world but appear not to be his own doing. His transforming influence touches the ten thousand things, but the people do not depend on him. With him there is no

promotion or praise - he lets everything find its own enjoyment. He takes his stand on what cannot be fathomed and wanders where there is nothing at all.” ...

[Guo, *Zhuangzi jishi* (vol. 1): 289-296; translation slightly modified from Watson, 2013 ed. (tr.): 55-57]

As vividly explained by the madman Jie Yu, an aggressive form of governance, with “principles, standards, ceremonies, and regulations” all stipulated by the ruler to make everyone “obey him” is by no means a good one. The reason is simple. “To try to govern the world like this is like trying to walk the ocean, to drill through a river, or to make a mosquito shoulder a mountain!” To Zhuang Zhou, a policy of non-interference is nothing but the best. This kind of non-interference governance is nicely called “*wuwei*” 無為 (literally, “non-action”), which first and very elaboratively appears in the *Laozi* (or the *Daodejing*) and then in the *Zhuangzi*, *Guanzi* 管子, *Huainanzi* 淮南子 and so on. To explain in modern words, it is something resembling the idea of *laissez-faire* (literally “allow to do”, “let things pass”) coined by a group of 18th-century French economists, “favoring a ‘hands-off’ policy” (Merriam-Webster Dictionary 2024). However, the term *wuwei* is absent from the paragraphs we have cited above, and what we can find there is merely the spirit of “non-action” or “non-interference”, meaning to let the ruled act according to their abilities or as they like.

*Wuwei* is a core notion of the *Laozi*, appearing 11 times in 9 chapters (2-3, 37-38, 43-48, 57, 63-64). The case of the *Zhuangzi* is rather complex. As mentioned, there are three types of *wuwei* depicted in the *Zhuangzi*, of which two belong to the ideas of Zhuang Zhou. The first type is typically personal or individualistic (Cheung 2010, chap. 3), meaning “idle of oneself” (concentrating on spiritual cultivation) or “hermit-spirit” (staying far away from officialdom). Conventional Chinese scholars such as Guo Xiang 郭象 (a. 252-312) and Zhu Xi 朱熹 (1130-1200) mostly perceive this as the sole manifestation of *wuwei* of Zhuang Zhou, which is highly inaccurate or strongly biased (Zhang 2024). The second type is strictly political or pragmatic, belonging apparently to the school of Huang-Lao (Cheung, 2010, chaps. 6-7), and can be found in “Tiandao” 天道 and “Tiandi” 天地 of the “Outer Chapters” of the *Zhuangzi*. The third type is purely philosophical. This one is not only close to the *wuwei* of the *Laozi* in spirits but also in content and narrative form (the *Laozi*, chaps. 2, 7, 34, 37; Zhang, 2023a & 2023b; Zhang, 2024). The most pronounced ones include: (a) Zhuang Zhou cites Lao Dan’s words directly; and (b) both Laozi and Zhuangzi appraise the government of *shengren* (Laozi’s word) - the sage-king or *mingwang* (Zhuangzi’s word) - the illuminating or illustrious king, who does not show off his merits before his people. It is just as said by Lao Dan, “The government of the illuminating king? His achievements blanket the world but appear not to be his own doing. His transforming influence touches the ten thousand things, but the people do not depend on him. With him there is no promotion or praise - he lets everything find its own enjoyment. He takes his stand on what cannot be fathomed and wanders where there is nothing at all.”

The third type of *wuwei*, an ideal form of governance repeatedly advocated by Zhuang Zhou, can be found in the chapters of “Keyi” 刻意, “Zhile” 至樂 and “Zeyang” 則陽 of the *Zhuangzi*,

and even in its exact wording “無為”. Regrettably, it is more than often neglected by influential Chinese scholars in the past. But this kind of in-depth understanding is crucial as the Zhuangzi thought has been appraised by sinologists (such as A.C. Graham and Jean-François Billeter) and contemporary Chinese scholars (such as Chen Guying 陳鼓應, Hsi-San Lai 賴錫三, and Chen Yun 陳贇) for its openness and the spirit of loving-kindness and hence, a world heritage to the mankind. Meanwhile, the current development of AI is far from sufficient to replace human-centric analysis and expert knowledge of human researchers of such kind because as we can see it clearly, the keyword *wuwei*, which is nearly indispensable for any AI processing, is completely absent from the quotations we cited above from Chapter 7 of the *Zhuangzi*.

#### **4.2.2. Gaps in AI-Driven Methods: A Critical Review**

AI-driven methods, despite their innovative potential, exhibit certain gaps when applied to the realm of the *Zhuangzi* study. One of the primary limitations stems from the inherent design of AI algorithms which are predominantly data-driven, lacking the ability to discern contextual and cultural subtleties crucial for a deep understanding of classical Chinese philosophical texts like the *Zhuangzi*. Moreover, the heavy reliance on pre-defined keyword search strategies could automatically constrain the scope of exploration, overlooking the interdisciplinary and intertextual engagements characteristic of the *Zhuangzi* study. Critical reviews also underscore the ethical considerations entailed with AI applications, particularly concerning such things as data privacy, intellectual property, and the potential for algorithmic biases (Boyd & Crawford, 2012). Addressing these gaps necessitates a multidisciplinary approach, melding the technical advancements of AI with the ethical, philosophical, and contextual insights offered by Critical Pedagogy and traditional methodological approaches.

### **4.3 Potential Improvements**

#### **4.3.1 Topic Modeling**

**Topic modeling**, employing algorithms such as Latent Dirichlet Allocation (LDA), emerges as a potent tool for uncovering thematic structures within extensive textual datasets (Barde & Bainwad 2017; Vayansky & Kumar 2020). It holds the promise of enhancing the efficiency and scalability of a large textual corpora analysis for the composite *Zhuangzi*. The method facilitates an expedited analysis, enabling scholars to sift through a broader range of texts in a fraction of the time that traditional methodologies would demand substantially. Furthermore, by statistically analyzing word co-occurrences and distributions, topic modeling can reveal latent themes and trends that might escape the naked eye, offering fresh perspectives and novel avenues for exploration. This is one advantage.

Another notable advantage of topic modeling is its potential to bridge interdisciplinary gaps. By identifying thematic overlaps and intertextual engagements, topic modeling fosters a cross-disciplinary exploration, intertwining the examination of the *Zhuangzi* with a philosophical, literary, or even scientific domain. However, this algorithm-driven analysis is not without its limitations. It may yield a more surface-level analysis, potentially overlooking important nuances inherent in the composite *Zhuangzi*'s philosophical discourse. A deep understanding of and



interpretive insights crucial for a comprehensive exploration of Zhuang Zhou's teachings primarily reside in the human domain of intellectual engagement, which topic modeling might not fully encapsulate. Furthermore, the effectiveness of topic modeling is heavily contingent on the quality and representativeness of the data. Any misrepresentation or biases inherent in the textual data can significantly skew the results, leading to a distorted understanding of the thematic structures within the text.

In the broader scope of the *Zhuangzi* study, topic modeling can serve as a springboard for in-depth analysis. For instance, setting it with a high-level overview of prevalent themes, topic modeling can guide scholars toward other areas (such as high literature, religion, aesthetics, and arts) warranting further exploration. And, when applying topic modeling across a diverse range of texts, including comparative analyses with other cardinal philosophical texts (such as the *Laozi* and the *Guanzi*), can help scholars yield a rich interdisciplinary insight. This, when fused with other AI-driven methods and traditional methodologies under the framework of Critical Pedagogy, could even foster a more nuanced and holistic approach to exploring the intricate landscape of political philosophy of the *Zhuangzi*.

#### 4.3.2 AI-Aided Databases (like Semantic Scholar, Elicit, Scite) in the Zhuangzi Study

The advent of AI-aided databases such as Semantic Scholar, Elicit, and Scite has significantly enriched the research landscape of the *Zhuangzi* study by providing advanced tools for LR, data analysis, and citation context understanding.

**Semantic Scholar** is an AI-powered research tool developed by the Allen Institute. It is designed to help researchers find relevant information swiftly by navigating through millions of research papers across various disciplines. Semantic Scholar distinguishes itself from general AI tools (e.g. CNKI) by using machine learning (ML) to understand the context and relevance of research papers, summarizing key points, and highlighting influential citations. This allows scholars in the *Zhuangzi* study to sift through a vast pool of literature efficiently, identifying the most pertinent and impactful works related to their interests and fields.

**Elicit** represents a newer class of research tools that leverage AI to extract and synthesize information from scientific texts. It is built to assist researchers in identifying relationships between concepts, methodologies, and results across a wide array of documents. For scholars focused on the *Zhuangzi* and Daoist philosophy, Elicit can be instrumental in tracing the evolution of specific ideas, comparing interpretations, and integrating insights from interdisciplinary studies that touch upon these ancient texts.

**Scite** is a platform that goes beyond traditional citation metrics to provide 'Smart Citations' by analyzing the citation context. It evaluates whether a paper has been supported or contradicted by subsequent research, offering a more nuanced understanding of its scientific impact. For the *Zhuangzi* study, Scite can be particularly useful in tracking how interpretations of the *Zhuangzi* have been received and critiqued over time, which is crucial for an area or field that relies heavily on historical scholarship and textual analysis.

All these AI-aided databases represent a significant advancement in research technology, allowing for a more systematic and interconnected approach to scholarly work. They enable researchers to uncover new relationships between texts, gain insights into a broader discourse, and

critically assess the influence of specific works within the realm of the *Zhuangzi* study. These platforms leverage AI to enhance the efficiency and quality of searching, retrieving, and analyzing scholarly articles, offering a more streamlined and reliable approach to data collection and LR.

One primary advantage of these AI-aided databases is their prowess to help and handle a vast amount of data for researchers, offering quick access to a wide array of resources pertinent to the *Zhuangzi* study. They employ advanced algorithms to filter, categorize, and recommend relevant articles, saving enormous time and energy that would otherwise be spent on manual LR. Moreover, these databases often feature intuitive interfaces and powerful search engines that enable precise keyword searches and provide insightful analytics on the retrieved data.

In addition, AI-aided databases facilitate a global collaborative environment for scholars. By centralizing and organizing the scholarly literature, they foster a shared knowledge base that researchers across the globe can tap into and contribute to, thereby promoting a more inclusive and collaborative scholarly ecosystem.

However, there are limitations to these AI-aided databases. The algorithm-driven nature of these platforms may sometimes overlook or misinterpret hidden discourses inherent in the *Zhuangzi* study, as explained above (see 4.2.1). The search results and recommendations are bound by the design and biases of the underlying algorithms, which may not always align with the researchers' objectives or the contextual intricacies of Zhuang Zhou's political philosophy.

Furthermore, the dependency on pre-defined keywords and algorithmic categorizations may sometimes constrain the scope of exploration, potentially sidelining lesser-known or seemingly self-contradictory perspectives within the *Zhuangzi*. This highlights a potential gap where the rich, multifaceted philosophical discourse of the *Zhuangzi* may be somewhat flattened or oversimplified when viewed through the lens of algorithm-driven platforms.

In sum, while AI-aided databases offer notable advantages in terms of efficiency, accessibility, and collaborative potential, they also present certain limitations that necessitate a balanced, critical approach. The synthesis of AI-aided databases with traditional, human-centric methodologies could possibly provide a more holistic and promising avenue for advancing the *Zhuangzi* study in the AI era.

#### **4.4 Expanding the Keyword Pool: A Multi-Lingual Approach**

The endeavor to delve deeper into Zhuang Zhou's philosophical discourse necessitates a clearer and broader understanding of the terminologies and notions inherent in the *Zhuangzi*. A robust keyword pool, transcending linguistic barriers, emerges as a pivotal asset in this regard. The proposition of expanding the keyword pool by adopting a multi-lingual approach, encapsulating keywords in both Chinese (Simplified and Traditional) and English, along with other relevant European languages that hold scholarly discourse on the *Zhuangzi* should be considered. As such, an expanded, multi-lingual keyword pool can augment the search capabilities within AI-aided databases and traditional database platforms alike. It can then facilitate a more comprehensive and inclusive search process, encompassing a broader spectrum of scholarly literature that spans across linguistic, geographical, and cultural boundaries. This approach potentially unveils a more richly textual and cultural understanding of the *Zhuangzi*'s philosophical landscape, drawing from a diverse array of scholarly perspectives and interpretations.

A multi-lingual keyword pool also helps foster an environment of inclusivity and global scholarly engagement. It bridges linguistic gaps, enabling scholars from varied linguistic backgrounds to engage with, contribute to, and enrich the global discourse on the composite *Zhuangzi*. This approach not only amplifies the depth and breadth of the research but also nurtures a global community of scholars united by a shared intellectual pursuit.

However, the task of curating and managing an extensive, multi-lingual keyword pool presents its own set of challenges. It demands a thorough understanding of the linguistic and semantic nuances across different languages. For example, “Zhuangzi” (in *Hanyu pinyin*) can be written as “Chuang Tzu” (in Wade-Giles) in English, and “Tchouang-tseu” in French. Moreover, the continuous updating and refining of the keyword pool to reflect the evolving scholarly discourse and terminologies require a collaborative effort and a well-coordinated, systematic approach. Last but not least, the effectiveness of a multi-lingual keyword pool is in part contingent on the capabilities of the search engines and databases employed. The ability to accurately interpret and search for keywords across different languages and scripts is pivotal for realizing the full potential of a multi-lingual keyword pool in advancing the *Zhuangzi* study.

In summary, expanding the keyword pool through a multi-lingual approach holds significant promise for enhancing the scope, inclusivity, and depth of research in the *Zhuangzi* and *Zhuangzi* studies. It presents an avenue for leveraging the synergies between AI technologies and human expertise, fostering in the research area a more robust and holistic exploration of *Zhuangzi*'s philosophical discourse in the AI era.

## 5. Reflections

Our first-stage exploration of the *Zhuangzi* study in the AI era presents a confluence of traditional scholarly rigor and cutting-edge technological innovation. Our investigation underscores that AI research tools and methods are not standalone solutions. Rather, they must synergize with the researchers' expertise in the related research field (cf. Dantas, Lucimar, Elsa Estrela & Zhe Yuan, 2022). The intricate philosophical discourse inherent in the composite *Zhuangzi* text necessitates a deep-seated understanding and interpretative prowess that resides predominantly within the domain of human intellect.

From a purely learning standpoint, integrating AI into the *Zhuangzi* study which has been conventionally attached to humanities, a field traditionally rooted in qualitative analysis, has proven to be an evident advancement, particularly in second and third-hand publication entries access. This integration facilitates a more streamlined and productive LR process, enabling research students to commence their scholarly journey with a substantial body of knowledge and a sense of encouragement. The rapid access to a wide array of resources, facilitated by AI, serves as a valuable springboard for deeper, more focused inquiry (see Chart 1-4). For novice researchers embarking on the path of the *Zhuangzi* study, the AI-assisted databases and tools act as a catalyst, accelerating the initial phases of literature exploration, and aiding in identifying key research gaps, seminal works, and emerging trends in the field.

Chart 1

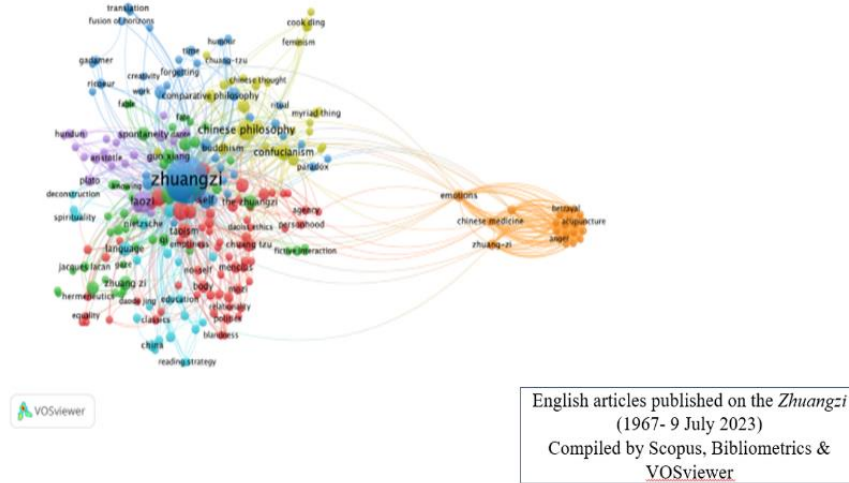


Chart 2

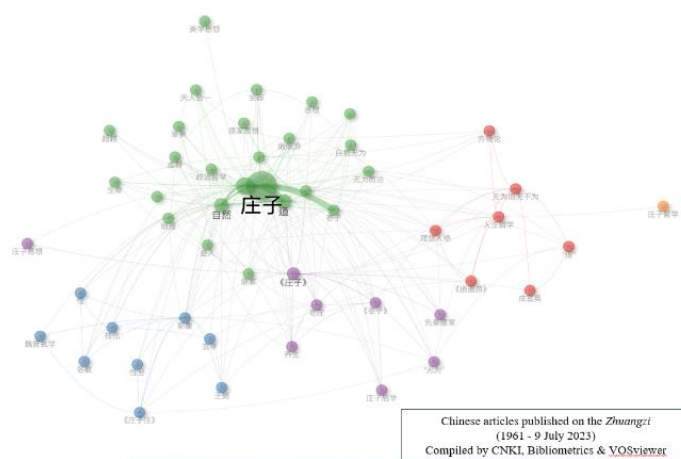


Chart 3

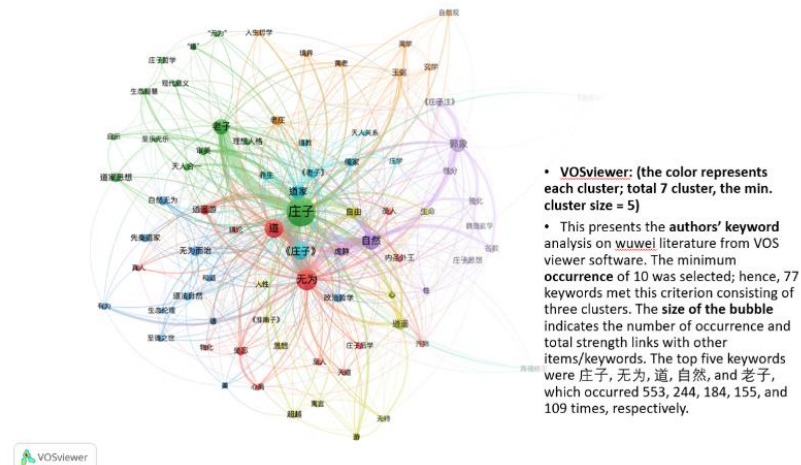
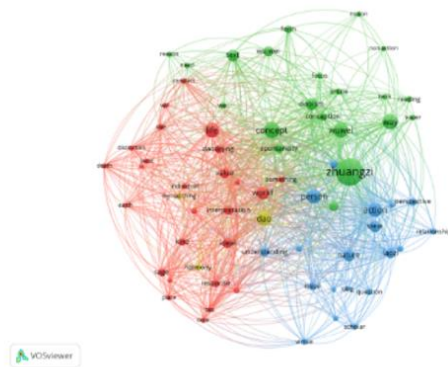


Chart 4

For the extraction of other patterns, VOSviewer was used to present comprehensive details in *wuwei* research

VOSviewer: (the color represents each cluster; total 4 cluster, the min. cluster size = 3)



This presents the authors' keyword analysis on *wuwei* literature from VOSviewer software. The minimum occurrence of 2 was selected; hence, 23 keywords met this criterion consisting of three clusters. The size of the bubble indicates the number of occurrence and total strength links with other items/keywords. The top five keywords were *wuwei*, *daoism*, *laozi*, *ziran*, and *zhuangzi*, which occurred 36, 35, 20, 18, and 12 times, respectively.

Second, the AI-driven approach fosters an environment conducive to collaborative learning and interdisciplinary engagement (Newman, 2023). By automating the tedious process of data collection and preliminary analysis, AI frees up time and cognitive resources for researchers and research students, allowing them to engage more deeply with the discourse they work on, and to cross-pollinate ideas with other related fields of study. This enhances not merely the learning experience, but also nurtures a culture of intellectual curiosity, critical thinking, and collaborative exploration, especially among research students.

Third, the AI-enabled analytics and visualizations provide researchers with intuitive, easy-to-grasp insights into the thematic structures and intertextual relations within the *Zhuangzi* text and related scholarly literature. This visual, interactive mode of learning facilitates a better understanding and retention of complex philosophical ideas, particularly for individuals who are new to the *Zhuangzi* study, or new to classical Daoist/Chinese philosophy.

Despite these advantages, it is imperative that the use of AI tools is to be guided by expert mentorship. Sound interpretative skills and critical engagement necessitated for a meaningful exploration of Zhuang Zhou's teachings should be developed through rigorous academic training empowered by mentorship. In this vein, the AI tools serve mainly as a complement, rather than a substitute, for the traditional mentor-mentee relationship, classroom discussions, and scholarly debates that form the bedrock of a robust learning experience. Because of this, from the lens of fine research, the current state of AI integration into the *Zhuangzi* study falls short of expectations. The findings of this paper have illustrated a prevailing need for substantial scholarly interference to supplement, compensate, or upgrade the AI-generated findings. The limitations of AI, particularly in grappling with the semantic complexity and contextual intricacies of Zhuang Zhou's philosophical discourse, with the example of *wuwei*, underscored once again the indispensable value of human-centric analysis. While AI can be a powerful tool for data collection and preliminary textual/thematical analysis, the depth of understanding, interpretative insights, and

critical engagement requisite for a comprehensive exploration of Zhuang Zhou's teachings are still nothing more than human endeavors.

The AI algorithms at their core are designed to identify patterns and trends within large datasets. However, any nuanced and especially innovative philosophical discourse of the *Zhuangzi*, laden with metaphorical expressions and contextual subtleties, often eludes the algorithmic analysis. The depth of interpretive insight required to engage with Zhuang Zhou's unique philosophical discourse, to discern the implicit meanings of the text, and to draw connections with broader socio-cultural and historical contexts with the Daoist school, is inherently a human, intellectual endeavor. The human scholar's ability to engage in reflective thinking, and to delve into the different layers of meaning within the composite text *Zhuangzi* (cf. Liu, 2015), is irreplaceable and paramount for advancing the scholarly discourse in this research area.

In addition, the critical review and discussion among scholars, the debates and dialogues that will ensue, and the professional mentorship provided to research students during postgraduate studies are all crucial aspects of fine research in the well-established and long-history scholarship of the *Zhuangzi*. This kind of human interaction fosters a deeper understanding, sparks new ideas, and drives the iterative process of knowledge construction and validation in the long run. The AI tools, despite their computational prowess, cannot replicate the rich, dialogical process of human interaction, the exchange of novel ideas, and the critical discourse central to the scholarly investigation after all.

Last but not least, ethical considerations, the questioning of biased/over-simplified assumptions, and a critical evaluation of textual/scholarly sources and methodologies available for use are integral to fine research in the *Zhuangzi* study. All these active engagements ensure the integrity, validity, and ethical soundness of the research, aspects that are beyond the purview of AI tools even in the long term. The human researcher's ability to engage in ethical reasoning, challenge unjustified assumptions, and critically evaluate the methodologies carefully applied and even to the findings already reached is central to ensuring the rigor and ethical soundness of any research in the *Zhuangzi* study.

In summation, the journey towards a developed methodology for the *Zhuangzi* study in the AI era must be a clever collaboration between man and machine. The fusion of AI's computational capabilities with the researchers' expertise and critical pedagogical framework could potentially usher in a new paradigm of scholarly exploration. This collaborative model not only augments the efficiency and breadth of research in the field of humanities but also ensures that a meaningful, multi-dimensional discourse (philosophical or something else) of the *Zhuangzi* is thoroughly explored and interpreted within the broader scholarly and societal context in the contemporary world.

## References

- Barde, Bhagyashree Vyankatrao, and Anant Madhavrao Bainwad. 2017. "An Overview of Topic Modeling Methods and Tools." In 2017 International Conference on Intelligent Computing and Control Systems (ICICCS): 745-50. <https://doi.org/10.1109/ICCONS.2017.8250563>.
- Boyd, Danah, and Kate Crawford. 2012. "Critical Questions for Big Data." *Information, Communication & Society* 15 (5): 662-79. <https://doi.org/10.1080/1369118X.2012.678878>.
- Boyd-Graber, Jordan, Yuening Hu & David Mimno. 2017. "Applications of Topic Models." *Foundations and Trends® in Information Retrieval* 11 (2-3): 143-296. <https://doi.org/10.1561/15000000030>.
- Chai, David. 2019. *Zhuangzi and the Becoming of Nothingness*. Albany: State University of New York Press.
- Chen, Xieling, Di Zou, Haoran Xie, Gary Cheng, & Caixia Liu. 2022. "Two Decades of Artificial Intelligence in Education: Contributors, Collaborations, Research Topics, Challenges, and Future Directions." *Educational Technology & Society* 25 (1): 28-47.
- Cheung, HY Anthea. 2010. *Le wuwei 無為 chez Guo Xiang : origines, évolution et apogée (Wuwei 無為 of Guo Xiang: its origin, evolution and culmination)*, PhD dissertation (EPHE-Sorbonne, Paris), 1-498.
- Cooper, Charlie. 2015. "Critical Pedagogy in Higher Education." In *Socially Just, Radical Alternatives for Education and Youth Work Practice*, edited by Charlie Cooper, Sinéad Gormally & Gill Hughes, 39–64. London: Palgrave Macmillan UK. [https://doi.org/10.1057/9781137393593\\_3](https://doi.org/10.1057/9781137393593_3).
- Dantas, Lucimar, Elsa Estrela & Zhe Yuan. 2022. "What Can AI Learn from Teachers and Students? A Contribution to Build the Research Gap Between AI Technologies and Pedagogical Knowledge." *European Journal of Education and Pedagogy* 3(6): 189-198. DOI: <http://dx.doi.org/10.24018/ejedu.2022.3.6.509>
- Deshpande, Anand, and Manish Kumar. 2018. *Artificial Intelligence for Big Data: Complete Guide to Automating Big Data Solutions Using Artificial Intelligence Techniques*. Birmingham Mumbai: Packt Publishing.
- Iqbal, Sehrish, Saeed-Ul Hassan, Naif Radi Aljohani, Salem Alelyani, Raheel Nawaz, and Lutz Bornmann. 2020. "A Decade of In-Text Citation Analysis Based on Natural Language Processing and Machine Learning Techniques: An Overview of Empirical Studies." arXiv. <http://arxiv.org/abs/2008.13020>.
- Kong, Siu-Cheung. 2023. "Generative AI for Teaching and Learning in Higher Education: Opportunities and Challenges", open talk given on 12 December 2023 at Hong Kong Shue Yan University.

- Lin, Yu-wei. 2012. "Transdisciplinarity and Digital Humanities: Lessons Learned from Developing Text-Mining Tools for Textual Analysis." In *Understanding Digital Humanities*, edited by David M. Berry, 295–314. London: Palgrave Macmillan UK. [https://doi.org/10.1057/9780230371934\\_16](https://doi.org/10.1057/9780230371934_16).
- Liu, Chao-Lin. 2020. "Optical Character Recognition, Word Segmentation, Sentence Segmentation, and Information Extraction for Historical and Literature Texts in Classical Chinese." In *Proceedings of the 32nd Conference on Computational Linguistics and Speech Processing, ROCLING 2020, Taipei, Taiwan, September 24-26, 2020*, edited by Jenq-Haur Wang and Ying-Hui Lai, 423-25. The Association for Computational Linguistics and Chinese Language Processing (ACLCLP). <https://aclanthology.org/2020.rocling-1.40>.
- Liu, Jennifer. 2016. "The Problem of Philosophy in Classical Chinese Thought: The Text Zhuangzi as Case Study." Thesis. <https://digital.lib.washington.edu:443/researchworks/handle/1773/35499>.
- Liu, Xiaogan. 2015. "Zhuangzi's Philosophy: A Three Dimensional Reconstruction." In *Dao Companion to Daoist Philosophy*, edited by Xiaogan Liu, 193-219. Dordrecht: Springer. <https://doi.org/10.1007/978-90-481-2927-0>.
- Merriam-Webster Dictionary, s.v. "laissez-faire," accessed June 24, 2024, <https://www.merriam-webster.com/dictionary/laissez-faire>.
- Newman, Joshua. (2023). *Promoting Interdisciplinary Research Collaboration: A Systematic Review, a Critical Literature Review, and a Pathway Forward. Epistemology*, 3-4. DOI: 10.1080/02691728.2023.2172694
- Ngwenyama, Ojelanki & Frantz Rowe. 2024. "Should We Collaborate with AI to Conduct Literature Reviews? Changing Epistemic Values in a Flattening World." *Journal of the Association for Information Systems* 25(1):122-136. DOI:10.17705/1jais.00869.
- Panicker, Parvathy. 2020. "Critical Pedagogy in the Implementation of Educational Technologies." arXiv. <https://doi.org/10.48550/arXiv.2006.00245>.
- Pavlidis, George. 2022. "AI Trends in Digital Humanities Research." *Trends in Computer Science and Information Technology* 7 (1): 026–034. <https://doi.org/10.17352/tcsit.000048>.
- Teubert, Wolfgang. 2015. "The *Zhuangzi*, Hermeneutics and (Philological) Corpus Linguistics." *International Journal of Corpus Linguistics* 20 (4): 421-44. <https://doi.org/10.1075/ijcl.20.4.01teu>.
- Vayansky, Ike & Sathish A. P. Kumar. 2020. "A Review of Topic Modeling Methods." *Information Systems* 94 (December): 101582. <https://doi.org/10.1016/j.is.2020.101582>.
- Wang, Yanhua. 2021. "A Comparative Study of Zhuangzi's Tao and Plato's Idea." *Sino-US English Teaching* 18 (5). <https://doi.org/10.17265/1539-8072/2021.05.006>.



Watson, Burton (tr.). 2013. *The Complete Works of Chuang Tzu*. New York: Columbia University Press: 92-97.

Zhang, Xiyi. 2007. 張喜儀：〈郭象“聖人”政治與黃老“無為而治”〉 (The *Shengren* Governance of Guo Xiang and the *Wuwei* of Huang-Lao). *Journal of Chinese Philosophy and Culture* 中國哲學與文化 (Chinese University of Hong Kong), Vol. 2: 342-369。

\_\_\_\_\_. 17 June 2024. 張喜儀：〈樹仁手記：莊子「無為」觀簡練勝莊子〉 (Mini-writing series of Shue Yan teachers: The *wuwei* notion of Zhuangzi is more concise than that of Laozi), *Wenweipo* 文匯報 (Hong Kong): A21 <https://www.wenweipo.com/epaper/view/newsDetail/mobile/1802397977642405888.html>。

\_\_\_\_\_. 20 June 2023 (a). 張喜儀：〈樹仁手記：《老子》「無為」思想等同躺平主義嗎？〉 (上), (Mini-writing series of Shue Yan teachers: Is the *wuwei* notion of the *Laozi* identical to the trendy movement of lying flat?), *Wenweipo* 文匯報 (Hong Kong): A21 <https://www.tkww.hk/epaper/view/newsDetail/mobile/1670851656629358592.html>。

\_\_\_\_\_. 4 July 2023 (b). 張喜儀：〈樹仁手記：《老子》「無為」思想等同躺平主義嗎？〉 (下), (Mini-writing series of Shue Yan teachers: Is the *wuwei* notion of the *Laozi* identical to the trendy movement of lying flat?), *Wenweipo* 文匯報 (Hong Kong): A21 <https://www.wenweipo.com/s/202307/04/AP64a32b60e4b043f3863976c3.html>。