

Development and Enlightenment of Artificial Intelligence Writing to Linguistics--A Case Study of ChatGPT

Junni Li *

Wuhan University of Science and Technology, Wuhan, China

* Corresponding Author Email: 1670377065@qq.com

Abstract. With the rapid development of artificial intelligence (AI), text generation has become a field of great concern. However, there are few related studies from the perspective of linguistics. Natural language processing technology should have been combined with linguistics, but traditional linguistics cannot provide sufficient theoretical support for large language models. Thus, linguistics is getting farther away from the needs of the times. This paper aims to analyze why the integration of large language models and linguistics is insufficient, with ChatGPT as an example to explain the text characteristics of AI writing and its reasons. In addition, this paper explores the impact of AI-generated text patterns on linguistics and how linguistics will develop in the new era.

Keywords: Artificial Intelligence; Text Generation; Linguistics; Natural Language.

The combination of artificial intelligence (AI) and large language models is a new development trend in the information age, which can be widely integrated with technologies in other fields to solve problems in human life. For example, the chatbot program ChatGPT (Chat Generative Pre-trained Transformer) released in 2022 is a natural language model driven by AI technology and an excellent example of combining AI and linguistics. Different from the service model of retrieving keywords, ChatGPT is a conversational interaction of a natural language that uses natural language instructions in the era of large models to deploy knowledge. It is more like the human brain with higher generalization, versatility and practicality,[1] which can be applied to text error correction, news writing, article summary writing, literary and artistic creation and other aspects. Once ChatGPT was released, it caused heated discussions around the world and became the application going viral at the fastest speed in history.[2] Many countries have jumped on the bandwagon of ChatGPT. For example, Thailand's project "Open ThaiGPT" is making progress.[3]

Global political issues also reflect the necessity of digital transformation and the development of large language models of AI. Countries around the world have deployed strategies and plans related to digital transformation.[4] The United States raised this issue as early as the 1990s. Meanwhile, the "European Recovery Plan" mentioned the need to accelerate digital transformation, followed by Japan and Russia. In 2017, Hiram College in the United States put forward the concept of "new liberal arts",[5] which was then introduced by China to describe the future discipline trend of integrating liberal arts and sciences, especially the trend of integrating traditional undergraduate courses (such as linguistics) and AI. The future development of China's digital economy is inseparable from the development and construction of large language models, because large language models rely on massive amounts of data, a key element of the digital economy.[6] The prosperous development of large language models and the digital economy lies in the data, especially the most important language data.[7] Therefore, the research on the combination of linguistics and AI has become a new hot spot. In 2018, the CPC Central Committee proposed the goal of building a new liberal arts.[8] Through the cross-combination of internal research in linguistics and related technologies such as AI, we can not only understand the problems of the development of linguistics itself, but also enable AI to perform better in text generation and information processing.

Large language models have attracted academia, for which scholars have paid more attention in terms of technology and practice. However, the research in the context of linguistics is slightly insufficient.

Scholars lay more emphasis on the specific application scenarios of AI, such as the construction of English teaching mode, online medical service, innovation of news dissemination mode, etc., or on the construction and training of technical models such as neural networks in terms of technology. However, in many fields of natural language processing, we are still in the following stage with a great defect in language ontology research. We failed to pay enough attention to the most original language and linguistic research related to the core architecture of artificial intelligence.[9] In the field of AI, language understanding is the crown jewel. In order to win this jewel, we have to find out the generation law of language understanding that is more in line with linguistic facts based on linguistic theory. Scholars in linguistics call for and welcome the arrival of intelligent linguistics or linguistic intelligence.[10] In addition, interdisciplinary subjects such as neurolinguistics and psycholinguistics in the direction of computational linguistics and brain-inspired research have emerged in large numbers. However, in the thriving information age, the development of linguistics is far from enough. The understanding and improvement of linguistic theory and how to combine it with AI are issues that linguists need to pay close attention to.

Given the shortcomings in the research of linguistics in the new era, this paper uses ChatGPT as the object to analyze the text writing of AI in the context of linguistics. In addition to explaining the differences between language generated by large language models and human natural language from a linguistic perspective, this paper also explores how this generated language develops and enlightens linguistics, with an attempt to discuss the text generation of large language models, so as to fill some gaps in interdisciplinary research in AI linguistics.

1. Necessity of Studying Generative AI from a Linguistic Perspective

The technology used by the large language model highlights its language processing capabilities. The large model uses a deep learning model of attentional mechanism, which allows it to predict the next word in language material based on distant text, and integrates semantics and syntax to generate specific text.[11] Deep learning models enable machines to learn rich language knowledge and language patterns in large-scale text data, allowing the models to understand and generate the semantics and grammar of natural language.[12] With the support of this technology, users can directly give instructions to machines in natural language without converting them into a programming language,[13] which improves the efficiency of AI in processing human instructions.

However, AI still has defects in the practical application of text generation. It often answers irrelevant questions, or the answers are mixed with fallacies, or the answers do not conform to public order and good customs. From the mathematical perspective, the generation of language does not depend on experience but on massive texts. In essence, its language processing is to use nonlinear regression algorithms to simulate laws through input materials to form automatic modeling, or to predict context texts through attention mechanisms, so that the output results conform to the context. It bypasses human language experience and replaces it with mathematical calculus.[14] Besides, there is a lack of research on its influence on the deep structure of language, linguistic values and pragmatics in academia. From the aspects of language values and pragmatics, the data sources of AI will inevitably be mixed with a lot of information that violates morality and law. If manual intervention is not timely or negative information is not completely eliminated, the output answers of AI will violate public order and good customs, causing adverse effects. When imitating natural language, machines are more like extracting "text blocks" from data training materials and splicing them with each other according to accurate grammar. These spliced words will perform poorly in the middle of complex language phenomena. For example, it cannot understand irony and will respond inappropriately to human-computer interaction. In addition, these generated text blocks may be meaningless or contain error messages,[15] leading to the need for people to have the necessary understanding of the actual language ability, potential risks and limitations of artificial intelligence. These risks also restrict its application and development in more complex language environments.[16] There was once a case in which a lawyer was eventually sanctioned for citing a case fabricated by ChatGPT as the basis of argument.[17]

Linguistics also plays a less effective role in large language models than expected. Linguistics could have provided theoretical support for large language models, and large language models provide application support for linguistics. However, the natural language processing of AI is more often faced with massive texts, which is inconsistent with the experience and presentation of linguistics without a natural combination. The role of mainstream linguistics in the current context of AI is very limited. Academia has made some theoretical attempts at the development direction of linguistics in the new era. If linguistics is to be developed, it is necessary to further explore characteristics of text generation in large language models and the combination of linguistics with AI.

2. Features of AI-Generated Text

Compared with human writing, the text generation method of AI features presentation, homogenization and learnability. The author will use ChatGPT as an example to describe specific picture content and analyze the emotional tendency hidden in the picture. ChatGPT is required to generate specific language content, and intervene and modify the generated content and format. Through the above methods, the author explains the characteristics of text generated by AI, and analyzes the reasons for this characteristic.

(1) Presentation

Presentation means that AI-generated texts do a better job of presenting specific information about things, especially compared with emotional descriptions. AI can be comprehensive when presenting specific information, and even use model calculations to complete unclear details. However, for the analysis and description of emotions, or the text generation of opinion discussions, AI is slightly defective with two main reasons as follows:

On the one hand, AI input materials are mostly presentational texts. To cope with tasks in different fields, AI's database contains numerous technical documents, books and other presentational texts in a wide range of fields. Presentation text is objective and neutral, and AI can generate efficient language on this basis. Language input with the characteristics of the times is also an integral reason. In the Internet era, information is inherently fragmented. Netizens are more willing to see concise information rather than large-scale explanations and opinions. However, the data sources of AI often come from the Internet, and the output results are more inclined to present fragmented language. On the other hand, users tend to assign information presentation tasks to AI with controversy about the literary recognition of AI-generated texts by the public. Compared with literary creation, people are more willing to engage AI in data presentation, graphic conversion, etc. In addition, the context is clearer with more direct tasks. From these aspects, the presentation language of AI is more applicable than literary language.



Figure 1. Pictures that Won the Funny Animal Photography Award

To analyze the presentation of the generated text in specific situations, a picture that won the Funny Animal Photography Award was selected to compare the performance of the generated text in these two aspects through ChatGPT's description of the picture and the explanation of the picture's humor. According to the comparison of the generated presentational text and sentiment analysis text, it is verified that AI is more suitable for generating presentational text rather than the text of emotional experience conveying category, with the interaction process as follows:

Author: Describe this picture.

ChatGPT: This image shows a vivid scene of three birds on a branch. The one on the far left is an adult green goldfinch, with an adult in the middle, while the one on the far right is a young bird opening its mouth. ... Adult birds are feeding young birds that open their mouths, as if they were asking for food or calling from adults. The back of the picture is soft and green with a blurred background.

Author: Why did this picture win the Funny Animal Photography Award?

ChatGPT: This image shows the interesting interaction of three little birds on a tree branch. The two little birds on the left and middle appear to be in affectionate conversation, while the one on the far right spreads its wings and appears to be responding or protesting fiercely, possibly "singing" or "arguing". This scene, which mimics human social behavior, particularly the exaggerated gesture and expression of the bird on the right with its wings spread, gives the picture a sense of humor reminiscent of similarly vivid and humorous social interactions in humans.

The presentation characteristics of AI-generated text are verified. ChatGPT not only describes the picture scene, but even analyzes the types and behavioral intentions of birds. In terms of text presentation, AI has been able to complete the task well. However, in terms of sentiment analysis, it has not achieved satisfactory results. The two birds on the left and middle don't look like "having a cordial conversation", and the bird on the far right doesn't seem to have "a fierce response or protest". The sense of humor in this picture comes from the fact that the bird on the far right seems to be "complaining" with the bird in the middle like a human child, which is very similar to the scene in a cartoon. The animal makes people laugh because it inadvertently takes on the manner of a human. There is still room for improvement in the discussion texts of AI in the emotional category. When AI discusses the emotional experience, or when generating some texts that are not directly presented but need to be polished and expressed, there are still some shortcomings in AI.

(2) Homogenization

Homogenization is divided into two aspects. One is the homogenization of text generated between different language models, which is called external homogenization. The other is the homogenization of text generated by the same language model, that is, internal homogenization. External homogenization refers to the similarity of language structure and language style of different large language models under the same type of text generated on the same topic. One of the reasons for this phenomenon is database overlap. The training data of large language models mainly stems from public data sets, enterprise private data sets, Internet public data, etc. Public data sets are shared with each other, and companies with higher-quality industry and private domain data will not share it with large models. At present, the training data sets of general large models mostly come from Internet text data. Therefore, the input data of different language models are highly repeatable. Another important reason is that it is difficult for data pre-trained models to make major innovations on an existing basis. From the perspective of technical routes, the current training methods of large models are relatively simple. The underlying technical route of large models has taken shape, and most companies are focusing on the development of existing technical paths. However, the research on innovative architecture is still in its early stages, so the homogeneous attributes of the AI-generated text have become increasingly prominent.[18]

Internal homogenization means that the same large language model generates different texts, and the generated text structure and words are very similar. There are two reasons for this phenomenon. On

the one hand, its own database is limited. Large language models rely heavily on input data. If the data is not updated at any time, the form and content of the input text are quite similar, and the output text is likely to become single and homogeneous. However, even for the purpose of universality, the data set constructed by extensively collecting literary texts from different regions and languages is still limited by the time and space of the source of the language materials themselves, which makes AI models inevitably inclined to a higher proportion of semantic content. On the other hand, users have limitations and put forward requirements to AI with their own intentions and understandings, which further makes the AI-generated text subject to the constraints of the user's cultural environment,[19] increasing the probability of homogenization. The quality and diversity of AI-generated content depend on user feedback. If users do not provide sufficient feedback, or only give positive feedback to a certain type of answer generated, AI may continue to generate similar content, resulting in the output becoming single and homogeneous.

(3) Learnability

Learnability refers to that AI can be continuously adjusted according to manual intervention until it meets the needs of users or improves previous mistakes based on manual prompts. In addition, learnability enables AI to learn new knowledge and improve the quality and accuracy of the generated text. Compared with the participatory experience of human-computer interaction, the human writing process is one-way and is read by people after completion. At this time, it is difficult for readers' thoughts to influence the completed text and readers' opinions can only be adopted by the author in the next work with a lag. However, in the text generation of AI, humans are both readers and creators, and machines are the medium for perspective transformation. It means that the author has a clear and accurate understanding of readers' text expectations, which can better provide text-related explanations and insights, help machines fill gaps in relevant texts, and urge machines to make timely improvements.[20] Under such circumstances, AI can continuously improve. The feedback in human-computer interaction will be used as training data for large language models, thereby promoting the entire large language model.

To have a clearer knowledge of ChatGPT's text adjustment during human-computer interaction, the author takes the second line of a couplet as an example to train ChatGPT.

The first couplet is: 翠翠红红,处处莺莺燕燕

ChatGPT: 依山傍水,家家杳杳冥冥

Author: The first four words should be AABB in style.

ChatGPT: 朝朝暮暮,处处草草木木

Author: The tone pattern is not consistent.

ChatGPT: 风风雨雨,年年朝朝暮暮

It can be seen from the process of human-computer interaction that ChatGPT can adjust the content according to the prompts, and the output can meet the user's relatively basic needs. For example, when the first and second lines in the couplet have the same style with a consistent tone pattern. However, its adjustment is only limited to the adjustment of words and formats. It is difficult to achieve allusion quotations and contain thoughts and emotions like human beings, even if it is only superficial imitation and superficial improvement.

3. Influence of AI Text Generation Mode on Linguistic Development

Large language models have brought changes in research methods to linguistics. Syntax and semantics can be integrated and studied from the mathematical aspect, thanks to the presentation and learning characteristics of AI. Chomsky has long emphasized syntactic research as a separate entity, separated from the rest of the language, but the operation mechanism of large language models is the opposite. Modern large language models integrate grammar and semantics in basic representation,

and combine discourse categories with semantic representation. This makes grammar not need to be additionally analyzed in the basic mechanism or model, and large language models can also generalize syntactically simultaneously as discourse understanding.[21] Such a combination of syntax and semantics improves the efficiency of text research, and syntactic research is no longer isolated. In addition, language symbols are arbitrary. In other words, there is no necessary relationship between form and meaning. However, language models cross this gap by constructing word vectors, and realize the combination of language and meaning. The crossing of the semantic gap means that linguistic meaning and form can be combined from the mathematical aspect. In future linguistic research, semantics can be combined with syntax and morphology to develop. Moreover, the traditional view is that human language is recursive, and language cannot be characterized by statistical probability models. However, the operation of large language models is based on probability statistics, which provides a new idea for linguistic research. The meaning and form of language, the generation of discourse, etc. can be described from the mathematical aspect, and the research method of linguistics can change from being rule-oriented to data-oriented.

The text generation mode of AI breaks the cognition that language and thinking should be identical, with the reason stemming from its presentation. Both the "Sapir-Wolf hypothesis" and Chomsky's view believe that internal thinking is inseparable from external communication.[22] However, AI does even better at presenting texts than humans who use thinking and experience to process language. Large language models demonstrate that grammar can exist and can be obtained separately from thinking and reasoning forms, rather than directly modeling the way the world works.[23] Almost all the structures seen in languages can come from a good string model. In the past, language and thinking were inseparable from the perspective of linguistics. However, the relationship between language and thinking needs to be re-examined in linguistic research now, which changes the foundation of linguistics. Correspondingly, a large part of the viewpoints describing the relationship between language and thinking in linguistics and philosophy, such as the isomorphism between language and thinking, need to be re-examined.

The learning nature of AI-generated text patterns allows it to learn abundant language knowledge to create new sentences without relying on the so-called universal grammar.[24] However, according to Chomsky's generative grammar theory, it is the universal grammar in the human brain that people learn a language and create brand-new sentences in a short time. AI can adapt to new language phenomena, output new language content, and even create some new genres and themes through continuous learning without depending on universal grammar. It proves that these models can handle dynamic and complex language environment through their own learning, which prompts academia to re-examine the theoretical basis of universal grammar, realize its limitations in explaining the mechanism of human language generation, and show the possibility that human beings have other mechanisms of language learning and understanding. In the future, we should consider bringing this linguistic phenomenon of AI into the research as one of the foundations for constructing linguistic knowledge system research.

4. Implications of AI-Generated Text for the Development of Linguistics

As a unique language phenomenon, the text generated by AI has the features that human writing does not have, which challenges the traditional theories of language learning, language thinking and language generation in linguistics. Linguistics should face up to these challenges to re-examine the existing theories, bring the language phenomenon of AI into the research category, adjust the direction for the next stage of development, and provide theoretical support for the language technology of AI. Specifically, the following three points deserve special attention.

(1) Provide Support for the Contextual Application of Machine Text Generation Language

AI-generated text shows its shortcomings in non-information presentation language, so its generated text should be improved in sentiment analysis and discussion description. AI-generated text has presentation, but its performance in sentiment analysis text is not satisfactory. This requires the

introduction of sentiment analysis and processing technology during data pre-training, allowing artificial intelligence to distinguish and learn different emotions through data models labeled with emotion labels. Besides, the processing of complex emotions depends on the development of linguistics to some extent. Because people often have behaviors inconsistent with language and emotion, such as "expressing an opinion with opposite words", it often needs contextual linguistics as theoretical support. Context linguistics provides a mechanism for AI to update the context. When there is an emotional turning point or change in dialogue, AI can dynamically analyze the context and make a correct response. In addition, the "Turing Test" to test the intelligence level of language use is somewhat backward under the development of the times. A new "Turing Test" needs to be formulated to ensure that machines can meet new requirements, especially in language ability. Linguistics can participate in the construction of this test and the analysis of data sets to check the contextual application of artificial intelligence.[25]

(2) Deepen the Use of Corpus to Achieve Better Training Results

The longitudinal exploration of the pragmatic value of corpus is the key to the breakthrough of current large language models. The key to the power of a large language model lies in the richness of the database. However, current large language models have encountered certain bottlenecks because the breadth of the input corpus is limited and it is difficult to grow. For example, the amount of training data in ChatGPT's latest version has reached 1025, which is difficult to further expand.[26] However, current AI only makes use of corpus in breadth, but does not make use of human text in depth. Because the diversity of human texts includes not only the diversity of text forms, but also the richness of pragmatic values. Human texts have become rich with time, and their diverse pragmatic values are indispensable. In view of the enlightenment brought by the development of human language, the key to future breakthroughs lies in achieving the same training effect with small data.[27] Machines should also master how to learn different text values and rich language usage from a small amount of corpus. Corpus should not only be used to train AI from the words and superficial meanings of language, but also to enrich its understanding of different language values.

(3) Help the Transformation of AI Language Concepts and Its Own Brain-Like Direction

The reason why AI can bridge the gap between semantics and syntax is the vectorization embedding technology of distributed semantics. However, its semantic research from the perspective of linguistics is completely insufficient. This method can only solve the expression and calculation in the mathematical world, and the concepts in its language cannot establish a connection with the real world, which is completely disconnected from the outside world. How to use linguistics to help transform the language concept of AI into the real world is a crucial issue at present.[28] Only when the language concept of AI is translated into reality can sentiment analysis technology and the learning ability of AI gain a new leap, because this opens up new dimensions in the physical world.

Large language models use brain-like technology, and linguistics should also need physiological support such as neurology to find ways for the human brain to operate efficiently in language learning and cognition. However, the current linguistic theory fails to reveal the language mechanism in the human brain to a large extent, resulting in the inability of linguistic knowledge to be well transferred to large language models. The success of brain-like intelligence such as ChatGPT also reminds linguists that the study on the nature and source of language not only asks for more brain-like research, but also requires to find relevant evidence supporting the development of language cognition from neural networks, and transform the explanation of language rules and the description of linguistic phenomena to the exploration of the underlying logic of language generation.

5. Conclusion

With the rapid development of language model technology, AI text generation has been widely used. Because of the special operating mechanism of large language models, the text generated by AI has the characteristics of presentation, homogeneity and learnability. AI has advantages in the rapid and

large-scale generation of text, outstanding information presentation capabilities, and strong learning and adjustment capabilities. However, it is easy to produce the homogenization, and it is slightly insufficient in opinion description and emotional expression. The success of AI text generation has subverted some viewpoints in traditional linguistics, which provided new ideas for linguistic theories and research methods. In the future, AI should strengthen its own text generation, especially situational discussion texts, and promote each other with linguistics through the deepening use of corpus. Linguistics should also be transformed in the future. Brain-inspired research will be a new topic combined with AI, which is also a better way out for linguistics in the new era.

References

- [1] Zhang, D. W. (2023). Understand what AIGC, ChatGPT, and large model are in one article. Retrieved from <https://new.qq.com/rain/a/20230512A05YCQ00>.
- [2] Xiao, X. G., Chu, X. J. & Liu, Y. (2023). The impact and countermeasures of ChatGPT to China's language strategy. *Journal of Tianjin Normal University (Social Sciences)*, (05): 65-66.
- [3] Ren, Z. (2024). To resist American technology giants, ASEAN develops local AI. *Global Times*, DOI:10.28378/n.cnki.nhqsb.2024.003978.
- [4] Lu, J. M. (2020). Embracing digital technologies in language research: An emerging language research paradigm driven by science and technology development. *Journal of Foreign Languages*, 43(04): 3-4.
- [5] Chen, C. L. & Yang, Y. (2024). Inheritance and development of Chinese linguistics under the background of new liberal arts. *Journal of Shanghai Jiaotong University (Philosophy and Social Sciences)*, 32(01): 13-14. DOI:10.13806/j.cnki.issn1008-7095.2024.01.002.
- [6] China Government Network. (2017). President Xi presided over the second collective study of the Political Bureau of the CPC Central Committee. Retrieved from http://www.Gov.cn/guowuyuan/2017-12/09/content_5245520.htm.
- [7] Li, Y. M. (2020). Data age and language industry. *Journal of Shandong Normal University (Social Sciences)*, 65(05): 89-91. DOI:10.16456/j.cnki.1001-5973.2020.05.008
- [8] Fan, L. M. (2023). On mechanism guarantee of the construction of new humanities and social sciences. *China Higher Education Research*, (05): 4-8. DOI:10.16298/j.cnki.1004-3667.2023.05.02.
- [9] Geng, L. B., Yin, G. F., Zhan, W. D. et al. (2021). Research status and prospects of computational linguistics. *Linguistic Sciences*, 20(05): 495-496.
- [10] Chen, C. L. & Yang, Y. (2024). Inheritance and development of Chinese linguistics under the background of new liberal arts. *Journal of Shanghai Jiaotong University (Philosophy and Social Sciences)*, 32(01): 13-14. DOI:10.13806/j.cnki.issn1008-7095.2024.01.002.
- [11] Yuan, Y. L. (2024). Challenges and warnings from large language models like ChatGPT on linguistic theories. *Contemporary Rhetoric*, (01): 4-6. DOI:10.16027/j.cnki.cn31-2043/h.2024.01.003.
- [12] Ting NLP. (2023). A new chapter in artificial intelligence: An in-depth understanding of the applications and prospects of large language models (LLM). Retrieved from <https://segmentfault.com/a/1190000044442544>.
- [13] Yuan, Y. L. (2023). Transcend chatbots and go towards general artificial intelligence: The success of ChatGPT and its enlightenment to linguistics. *Contemporary Linguistics*, 25(05): 634-635.
- [14] Yang, Y. N. (2024). Linguistics and artificial intelligence: The next decade. *Foreign Language Learning Theory and Practice*, (03): 4-6.
- [15] Yu, M. L. & Shen, Y. (2024). Analysis of key language issues in generative artificial intelligence. *Youth Journalist*, 2-3. Retrieved from <https://doi.org/10.15997/J.cnki.qnjz.20240520.001>.
- [16] Yu, M. L. & Shen, Y. (2024). Analysis of key language issues in generative artificial intelligence. *Youth Journalist*, 2-3. Retrieved from <https://doi.org/10.15997/J.cnki.qnjz.20240520.001>
- [17] Smart Baidu Cloud. (2013). Lawyers' misuse of ChatGPT: Pitfalls and reflections on case citations. Retrieved from <https://cloud.baidu.com/article/1964127>.
- [18] The Paper. (2023). The homogenization dilemma of the 100-model war: Allow diversity or adhere to old traditions? Retrieved from https://www.thepaper.cn/newsDetail_forward_24849837.
- [19] Zhu, T. Y. (2024). Can artificial intelligence write? The difficulties of creativity and collective solution in generating "para-literary texts". *Nanjing Journal of Social Sciences*, (07): 117. DOI:10.15937/j.cnki.issn1001-8263.2024.07.011.
- [20] Zhang, Y. (2024). An analysis of ChatGPT text generation mechanism and textual characteristics. *Journal of Chongqing University of Arts and Sciences (Social Sciences Edition)*, 43(04): 109. DOI:10.19493/j.cnki.issn1673-8004.2024.04.009.

- [21] Language Governance. (2023). Has Chomsky's path to linguistic research been subverted by computational science? Retrieved from <https://mp.weixin.qq.com/s/sYeAMrQR7M90OYo6ihT7tw>.
- [22] Yuan, Y. L. (2023). Theoretical reflections on linguistics studies against the background of AI great leap forward. *Chinese Journal of Language Policy and Planning*, 8(04): 9. DOI:10.19689/j.cnki.cn10-1361/h.20230401.
- [23] Language Governance. (2023). Has Chomsky's path to linguistic research been subverted by computational science? Retrieved from <https://mp.weixin.qq.com/s/sYeAMrQR7M90OYo6ihT7tw>.
- [24] Yuan, Y. L. (2024). How to test ChatGPT's performance in semantic understanding and common-sense reasoning: Challenges and opportunities of linguistics in the era of large language models. *Chinese Journal of Language Policy and Planning*, 9(01): 49-51. DOI:10.19689/j.cnki.cn10-1361/h.20240105.
- [25] Yang, Y. N. (2024). Linguistics and artificial intelligence: The next decade. *Foreign Language Learning Theory and Practice*, (03): 4-6.
- [26] Zhu, T. Y. (2024). Can artificial intelligence write? The difficulties of creativity and collective solution in generating "para-literary texts". *Nanjing Journal of Social Sciences*, (07): 117. DOI:10.15937/j.cnki.issn1001-8263.2024.07.011.
- [27] Yuan, Y. L. (2024). Challenges and prospects for linguistics in the context of ChatGPT. *Modern Foreign Languages*, 47(04): 574. DOI:10.20071/j.cnki.xdwj.20240523.009.