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Original Paper

A Visual Analysis of Ecological Discourse Analysis Based on CiteSpace

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Abstract

Ecological discourse analysis, as an important branch and emerging direction within linguistics as well as ecological linguistics, has received relatively limited comprehensive reviews in current research. Therefore, based on English and Chinese literature on ecological discourse analysis from the Web of Science and CNKI databases, this paper utilizes the collaboration map, clustering view (keyword analysis), mutation word analysis, and other functions of information visualization analysis software CiteSpace 6.3.R1. It systematically analyzes the current research status, hot topics, and development trends in ecological discourse analysis. The paper also summarizes future directions and trends in this field, aiming to provide theoretical and practical references for domestic scholars planning to conduct related research in the future.

Keywords

ecolinguistics, ecological discourse analysis, citespace, visual analysis

1. Introduction

With the rapid development of economy and science, the ecological environment of human beings is deteriorating at an accelerated rate, and the global ecological problems are becoming more and more serious. More people realize that these ecological problems are threatening the survival and development of human beings, the linguistic community also attaches great importance and concern to ecology, and they have reflected on the mainstream Western discourse system in the context of rapid economic development, which has led to the awakening of ecological awareness of language. In this context, ecological linguistics has emerged.

Ecological linguistics is a discipline that studies the relationships between language, environment, ecosystems, and socio-cultural contexts. There are two widely accepted research models in the field of

ecolinguistics: the Haugen model and the Halliday model (He & Zhang, 2017). The Haugen model, also known as the Ecology of Language, focuses on linguistic diversity and emphasizes linguistic metaphors, arguing that linguistic ecology is the study of "the interactions between any given language and its environment" (Haugen, 1972, p. 57). The Halliday model focuses on the influence of language on ecology, emphasizes the non-metaphor of language and the role of language in environmental problems, believes that human beings describe and reflect reality through language, an important part of survival (Halliday, 1990).

And there are two complementary relations between the two models. One is the study of the relationship between language and speech community and the relationship between language and environment. The other is the analysis of ecological discourse and the ecological analysis of discourse. Many scholars (e.g., Alexander & Stibbe, 2014) advocate ecological analysis of discourse, because the ecological analysis of discourse involves a wider range of text types, and researchers can analyze any type of discourse from an ecological perspective to discover ecological and non-ecological factors of the language system, making the study more holistic, pluralistic and systematic (Zhao & Huang, 2017).

Alexander and Stibbe (2014) pointed out that ecological linguistics first studies the complex relationship between people, other species in human and nature, and all environments. In all activities, the influence of language cannot be ignored. Therefore, ecological discourse analysis is not limited to the study of issues related to ecological discourse. According to Halliday (1990), language creates meaning and is the medium of constructing reality. All people's words reflect what they think and do. Analyzing discourse from an ecological perspective can reveal problems that we have not noticed before.

Ecological discourse analysis is carried out in the framework of ecolinguistics. However, some concepts, terms, research contents, research scope and research methods covered in this research field have not been clearly or generally stated since the history of ecolinguistics is not very long. And only a few scholars have conducted comprehensive reviews of linguistics or ecological linguistics (Li & Xu, 2018). No scholar has yet systematically analyzed the current development status of ecological discourse analysis. Currently in China, many scholars have been using visualization analysis software to conduct literature reviews of various disciplines, studying the development status of fields such as international academic discourse research (Deng & Zhou, 2020), ubiquitous learning research (Liu & Liu, 2021), second language writing feedback research (Qu & Liu, 2021), and others.

Therefore, this paper will use visualization analysis software to systematically analyze current research in ecological discourse analysis. By using the scientific knowledge mapping tool CiteSpace 6.3.R1, we select relevant literature on ecological discourse analysis from the Web of Science database and also includes studies from the CNKI database. CNKI is chosen due to its extensive collection of research on ecological discourse analysis. This paper describes the current situation of ecological discourse analysis research from the aspects of annual publication trend, high-impact literature, research hotspots and

development trend, aiming to provide some theoretical and practical reference for our Chinese linguists to carry out relevant research.

2. Method

With the help of scientific knowledge mapping tool CiteSpace 6.3.R1, this paper draws the knowledge mapping of ecological discourse analysis research, aiming to answer the current situation of ecological discourse analysis research and the research hotspots and trends.

To explore the current global research landscape of ecological discourse analysis, this study primarily sourced literature from the WOS database. The main keyword used was "ecological discourse analysis." The time span selected was up to January 1, 2024, and the literature type was limited to "article". All abstracts underwent review, and irrelevant literature was excluded. In total, 633 papers were ultimately obtained for analysis.

When studying the global landscape of ecological discourse analysis, the publication output from China is also significant and cannot be overlooked. Therefore, in addition to selecting literature from the WOS database, this paper also includes relevant literature from the CNKI database regarding ecological discourse analysis in China. This approach aims to provide a more comprehensive understanding of the current research status in this field. We focused on "ecological discourse analysis" and "harmonious discourse". The time span covered all years up to January 1, 2024. Non-research papers such as interview records, meeting minutes, training materials, or meeting notices were manually excluded. In total, 257 relevant papers were identified for analysis on CNKI.

This paper uses CiteSpace 6.1.R1's collaboration map, clustering view (keyword analysis), mutation word analysis and other functions to analyze the annual publication trend, high-impact literature, main research fields, research hotspots, research frontiers and so on.

3. Result

3.1 Annual Posting Trend

The papers of ecological discourse analysis published on Web of Science and CNKI from 2008 to 2023 are counted, and the trend of annual publication of ecological discourse analysis literature research is drawn, as shown in Figure 1. It can be seen from Figure 1 that since 2008, foreign ecological discourse analysis research has generally shown an upward trend. Specifically, since 2015, the research in this field has entered a stage of rapid development. The posting amount decreased in 2022, but the amount is still bigger than the posting amount in China. And as mentioned above, the picture uses a dotted line to represent the trend. It can be observed that to some extent, China started researching ecological discourse analysis relatively later. Although China started its research in this area relatively late, it is evident that related studies are closely following international trends and aligning with global developments.

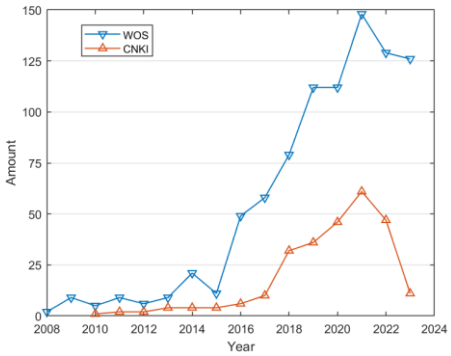

Figure 1. Annual Posting Trend

As an emerging branch of linguistics, ecological discourse analysis is not well studied in all aspects. The number of papers published in 2021 has reached its peak, indicating that scholars are enthusiastic about the research of this discipline, and there will be more and more research in the future.

3.2 Core Areas

Keywords is a high generalization of the research object and content of the article. Through the understanding of keywords, readers can grasp the main content of the article. If a keyword appears repeatedly, it means that the keyword is a research hotspot in this field (Chen et al., 2015). Keyword co-occurrence map and keyword clustering map are the functions of Citespace visual view. Through the observation and analysis of co-occurrence map and clustering map, the research hotspots in this field can also be clearly revealed, so as to provide reference for the development of this field. So, this paper draws the keyword co-occurrence map and keyword clustering map of ecological discourse analysis research published on WOS through Citespace 6.3.R1 to find out the research hotspots. The results are shown in Figure 2 and Figure 3.

From Figure 2, we can see that the word “climate change” occupies the first place in the co-occurrence network, followed by “discourse analysis”. It reflects that in foreign countries, the research in this field abroad mainly focuses on practical application. Some high frequency keywords such as “politics”, “science” and “policy” show that more foreign scholars apply ecological discourse analysis to various fields and solve practical problems through ecological discourse analysis.

According to the cluster analysis results of Figure 3, Q = 0.4544, S = 0.7535. It indicates that the clusters within nodes are closely linked and the results have reference value. There are 10 clusters. They are: ecosystem services (cluster 0), discourse analysis (cluster 1), critical discourse analysis (cluster 2), resilience (cluster 3), eco-innovation (cluster 4), environmental education (cluster 5), computational social science (cluster 6), ecological economics (cluster 7), south Africa (cluster 8), and arts and culture policy (cluster 9).

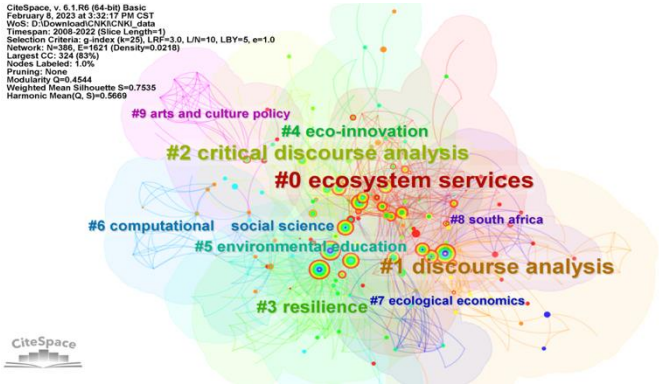

Figure 2. Keyword Co-occurrence Map (WOS)

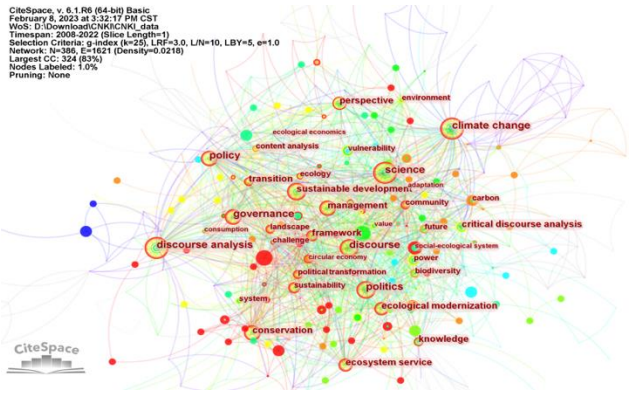

Figure 3. Keyword Clustering Map (WOS)

Combining Figure 2 and Figure 3, we can see that ecological discourse analysis research around the world pays more attention to practical application. Ecological discourse analysis is combined with various fields and used to solve environmental problems, ecological problems and policy problems and so on. This also shows that foreign research is more in-depth and extensive.

We also draw the keyword co-occurrence map and keyword clustering map of CNKI. The results are shown in Figure 4 and Figure 5.

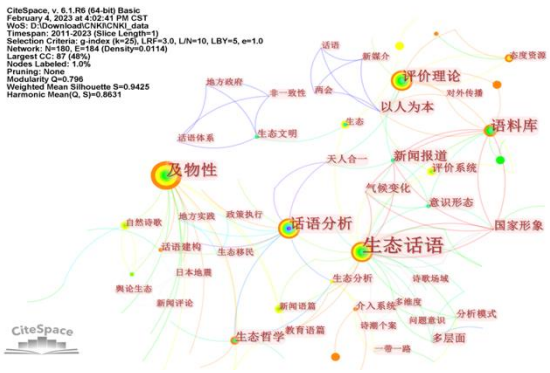

Figure 4. Keyword Co-occurrence Map (CNKI)

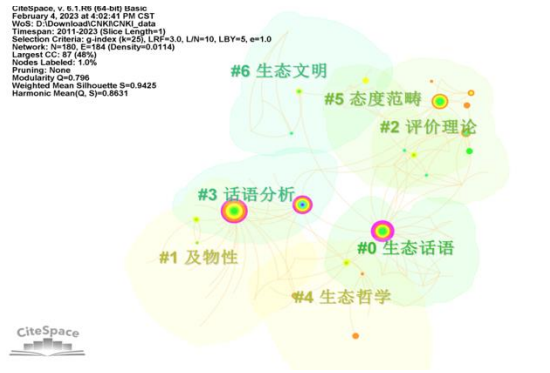

Figure 5. Keyword Clustering Map (CNKI)

As shown in Figure 4, the word “transitivity” occupies the first place in the co-occurrence network, followed by “ecological discourse”, which reflects that the subject is still in the stage of concept introduction and promotion.

As shown in Figure 5, there are seven clusters. They are: ecological discourse (cluster 0), transitivity (cluster 1), appraisal theory (cluster 2), discourse analysis (cluster 3), ecological philosophy (cluster 4), attitude category (cluster 5) and ecological civilization (cluster 6). The clustering value “Modularity Q” and the clustering internal similarity index “Silhouette” in the upper left corner are the basis for judging the mapping effect. Chen et al. (2015) pointed out that the value interval of Q is [0,1), and when Q > 0.3, it means that the clustering structure displayed in the map is significant. When S > 0.5, the clustering result is reasonable. The results show that Q = 0.796, S = 0.9425. It indicates that the clusters within nodes are closely linked, the thematic relevance of nodes within clusters is strong, and the results have reference value.

Combining Figure 4 and Figure 5, we can see that the research hotspots of ecological discourse analysis in China mainly focus on the fields of systemic functional linguistics, ecological linguistics, ecological critical discourse analysis and harmonious discourse analysis. The current research mainly focuses on the theoretical foundation and the basic research of related theories and so on, which is also

in line with the reality of the early formation and rapid development of emerging disciplines. Therefore, compared to research on a global scale, China's current studies are relatively lagging behind, primarily focusing on theoretical research stages, while much of the foreign literature has already shifted towards practical applications. Hence, Chinese scholars could benefit from studying the research hotspots abroad in order to advance China's research progress in ecological discourse analysis.

3.3 Research Hotspot Changes

In order to understand the changing trend of research hotspots in this field more clearly and intuitively, this paper draws a keyword clustering timeline diagram. The results are shown in Figure 6.

It can be seen from Figure 6 that the keywords of these ten clusters have obvious time horizontal lines with each other, indicating that the research heat of each cluster has certain continuity. From the time line of each cluster, the earliest keywords of cluster # 1, cluster # 2, cluster # 3, cluster #5 all appeared before 2010, which belongs to the earlier research hotspot of cluster time point, but the development speed, end time of each cluster and the evolution path are different. Different from the domestic keyword clustering timeline diagram, we can see that the foreign cluster hotspots mainly experienced horizontal evolution, but the vertical evolution between each cluster is less. This reflects that foreign research involves various fields, and the links between various fields are not very close, but the research in each field is gradually deepening. It is worth mentioning that there are more nodes in clustering # 0 and # 2, indicating that these two research directions have always attracted the attention of scholars and are still research hotspots. Cluster # 4, cluster # 6, cluster # 7 and cluster # 9 started late and belong to the newer research directions.

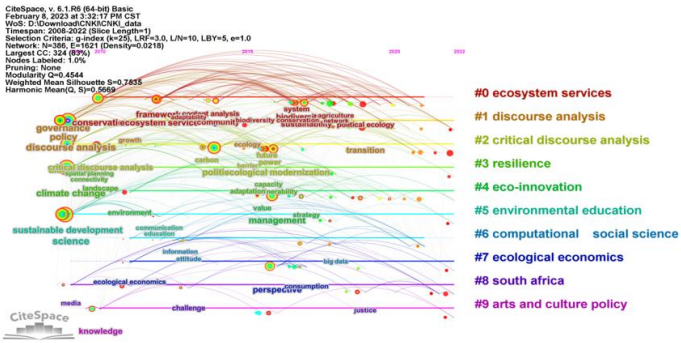

Figure 6. Keyword Clustering Timeline Diagram (WOS)

And the keyword clustering timeline diagram of Chinese literature was shown in Figure 7. It can be seen from Figure 7 that the keywords of these seven clusters have obvious time horizontal lines with each other, indicating that the research heat of each cluster has certain continuity. From the time line of each cluster, the earliest keywords of cluster # 0, cluster # 2, and cluster # 3 all appeared before 2015, which belongs to the earlier research hotspot of cluster time point, but the development speed, end time

of each cluster and the evolution path are different. Among them, the evolution path of cluster # 0 is the most abundant. In addition to its own research heat, it has also evolved horizontally into other clusters, laying a network relationship between ecological discourse, discourse analysis, ecological philosophy and systemic functional linguistics. Custer # 2 is a hot topic in this field, which has continued since the beginning. It shows that the evaluation theory is closely related to the research of ecological discourse analysis, which provides a theoretical basis and research direction for the research of ecological discourse analysis. As for other clusters, cluster # 1, # 4, # 5, and # 6 appeared late, the first hot keyword appeared around 2015, but these four clusters developed rapidly and became the research hotspot and main development trend in the past five years.

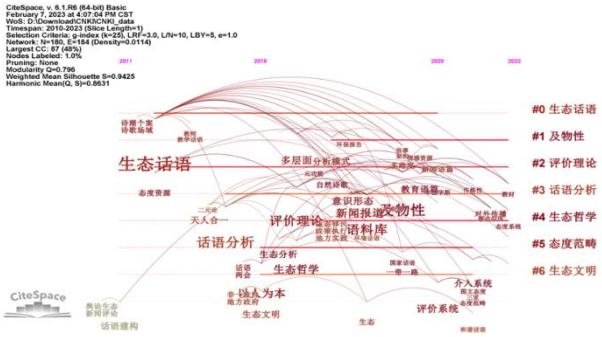

Figure 7. Keyword Clustering Timeline Diagram (CNKI)

3.4 Research Frontier

Compared with high-frequency keywords, the dynamic change characteristics of mutant words can accurately reflect the research hotspots and research frontiers in a certain research field (Chen et al., 2015). CiteSpace 6.3.R1 can also count the citation burst of keywords, and the results are shown in Figure 8. For the convenience of comparison, this paper also selected the top 11 keywords with the strongest citation bursts, the same as the domestic data.

Top 11 Keywords with the Strongest Citation Bursts

Keywords	Year	Strength	Begin	End	2008 - 2022
ecological economics	2011	1.88	**2011**	2017	
adaptation	2015	1.99	**2015**	2016	
ecological modernization	2016	2.74	**2016**	2017	
power	2016	2.51	**2016**	2019	
system	2017	2.11	**2017**	2018	
security	2017	2	**2017**	2018	
biodiversity	2017	1.94	**2017**	2019	
environment	2011	3.53	**2018**	2020	
critical discourse analysis	2010	2.6	**2019**	2020	
political ecology	2019	2.11	**2019**	2022	
transition	2019	2.13	**2020**	2022	

Figure 8. Citation Burst of Keywords (WOS)

It can be inferred from Figure 8 that foreign ecological discourse analysis research can be roughly divided into three stages. The first stage is 2011-2017, during this stage, the scholars mainly focus on the ecological economics and ecological modernization. They mainly study the relationship between ecology and economic development, focusing on the fields related to ecology and economy. The second stage is 2017-2019, in this stage, there are many mutation words related to the ecological environment, such as system, power, environment, biodiversity etc., indicating that scholars at this stage have used ecological discourse analysis to conduct more in-depth research on ecological issues. The third stage is 2019-2023, there are more critical discourse analysis to analyze policy ecology and the use of transitivity for ecological discourse analysis during this stage. The research hotspots are similar to the hotspots in China, indicating that transition and critical discourse analysis are the research frontier in this field now.

As for Chinese literature, the result was shown in Figure 9. It can be inferred from Figure 9 that domestic ecological discourse analysis research can be roughly divided into two stages. The first stage is about 2014-2019. The research at this stage mainly focuses on the related concepts and theoretical significance of discourse analysis, ecological discourse and systemic functional linguistics. Among them, the intensity value of "discourse analysis" is the largest, indicating that the research of ecological discourse analysis is still in its infancy. The second stage is about 2019 to the present. After 2019, mutant words such as "news discourse", "natural poetry" and "transitivity" appeared, indicating that the research at this stage gradually changed from research theory to practical application. Scholars began to conduct more in-depth research on ecological discourse and tried to use relevant theories and models to study ecological discourse and significance in various fields. We can see that interventional system and transitivity are the research frontiers in this field.

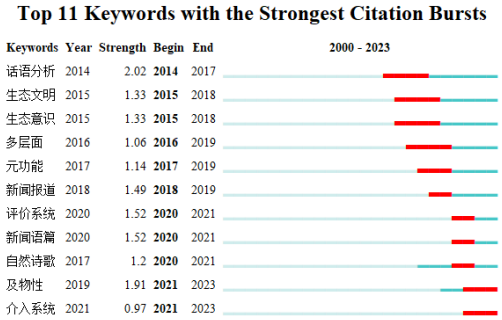

Figure 9. Citation Burst of Keywords (CNKI)

4. Discussion

Based on the CiteSpace 6.3.R1, we analyzed and summarized the research literature of ecological discourse analysis by combining qualitative and quantitative methods, and explored the development

status and future development direction of this field, so as to provide reference for the future development of ecological discourse analysis.

The research shows that the number of research papers on ecological discourse analysis all over the world has shown a rising trend and the research topics are roughly the same, all around ecolinguistics, systemic functional grammar and integration with other fields. Chinese research hotspots have gradually changed from theoretical research to theoretical practice. Worldwide research hotspots focus on in-depth research on practical problems in different fields, there is also a trend towards interdisciplinary integration with other disciplines.

Based on this, this paper puts forward two suggestions for the development of ecological discourse analysis in China. From the perspective of development direction, the future development of Chinese ecological discourse analysis should pay more attention to the combination with other new fields, especially with political, economic, artistic and scientific fields and the research directions need to be diversified; the foreign ecological discourse analysis should pay more attention to the links between various fields. From the perspective of research methods, the development of this field should also strengthen the use of quantitative tools such as corpus tools and data statistics tools, and combine empirical research with qualitative research to enhance the persuasiveness of the article.

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