| **RESEARCH ARTICLE**

A Wmatrix-based Analysis of Proximization Strategy of Environmental Discourse: A Case of *Silent Spring*

Juanjuan Liu
College of Foreign Studies, Jinan University, Guangzhou, China
Corresponding Author: Juanjuan Liu, **E-mail**: ljj18339170311@163.com

| **ABSTRACT**

Proximization Theory has been a hotted theory utilized in the field of critical discourse analysis. *Silent Spring* is a pioneer work describing how chemicals cause harm to the environment. This paper, under the guidance of Proximization Theory and semantic domains provided by the corpus tool Wmatrix, attempts to analyze the proximization strategies used in *Silent Spring* about the effects of chemicals on the environment. Based on three aspects of Proximization Theory: space, time and axiology, the paper investigates the frequencies and instances of proximization strategies used in *Silent Spring*. Besides, the paper also summarizes the specialized characteristics of proximization strategies in *Silent Spring,* which may lay a foundation for further research on environmental discourse: 1) *Silent Spring* frequently uses spatial proximzation strategies to emphasize the actual harms of chemicals to the environment. 2) In terms of temporal strategies, *Silent Spring* prefers the perfect tense to highlight the longitude of harm of chemicals. 3)In terms of axiological strategies, *Silent Spring* shows the conflict of ideologies between the two opposite parts in the discourse through the author's evaluations of the harms of chemicals.

| **KEYWORDS**

Proximization Strategies; *Silent Spring*; Environmental Discourse; Wmatrix

| **ARTICLE INFORMATION**

1. Introduction

Since critical discourse analysis received extensive attention, various kinds of discourse analysis theories have come into being, to which Proximization Theory belongs. Proximization theory is a kind of discourse analysis theory proposed by the Polish scholar Cap (2013, 2014, 2017, etc.), who combines cognitive linguistics, pragmatics and critical analysis and then puts forward his theory. Proximization theory belongs to a paradigm of cognitive linguistic research and has strong explanatory power (Zhang, Lin & Dong, 2021), which can be used to analyze discourse strategies adopted by a certain social group or political group for the sake of their own interests. The strategies include those that negatively present entities separated by time and space (including certain adverse ideologies) to speakers and hearers (Cap, 2014: 17). At present, studies about Proximization Theory are mainly divided into two types, one concerning the interpretation and development of the theory (Cap, 2010, 2013, 2017; Wu, 2016; Song, 2019), the other including the application of theory to various types of discourse analysis. At first, it was used in the study of state political discourse, and then later, its scope of application was extended, which contains immigration discourse (Wu & Niu, 2018), media stance (Zhou, 2021), anti-epidemic discourse (Yao, 2021) and so on. Though the application scope has been extended, unfortunately, the environmental discourse has not received enough attention. And it is a major research gap. As a pioneering work in environmental discourse, *Silent Spring* has been widely regarded since its republication. This book directly reveals the reality that chemicals like insecticides have severely harmed the environment, which leads to the rise of the modern environmental movement (Zheng, 2022). Based on what has been discussed, the paper tries to utilize Proximization Theory to analyze the representative environmental

discourse *Silent Spring* with the aim of explaining environmental discourses from a new perspective and also increasing the explanatory power of Proximization Theory.

2. Literature Review
2.1 Origins of Proximization Theory

Proximization Theory originates from Chilton's (2014) Discourse Space Theory: in discourse, people will locate discursive entities related to themselves and other entities far away according to three axes: space, time and modality (2004:157). The intersection of these three axes is called the deictic center. In the deictic center, the spatial axe represents "us" and "here"; the temporal axe represents "now"; the modal axe represents "maximum possibility". Things outside the deictic center represent "they", "past and future", and "minimum possibility" (Zhang & Yan, 2019). Discourse Space Theory lays a solid foundation for critical discourse analysis, but Cap (2017: 96) points out several shortcomings of Chilton's theory. Firstly, Chilton's deictic center is "static" and "fixed", which means that it cannot explain the movement of peripheral entities to the deictic entities in the discourse and also cannot explain the temporal extension often in the political discourse. Secondly, based on the space-time-modality category, Discourse Space Theory "fails to establish the psychological representations which are constructed by speakers and writers under pressure and are consistent with their discursive goals" (Zhang & Yang, 2019). Thirdly, Discourse Space Theory emphasizes qualitative analysis rather than the quantitative analysis of lexical-grammatical choices.

Based on Discourse Space Theory and its shortcomings, Cap puts forward Proximization Theory, whose first application is to the study of political discourses (such as the discourse concerning the wars between the United States and Iraq). Proximization Theory emphasizes that "speakers will use a variety of linguistic methods to highlight that the distant entities are gradually encroaching on the geographical and ideological domains of speakers' and hearers' and its main goal is to legitimize their actions and policies and to eliminate the far-reaching influences from the distant entities" (Wu et., 2016). Its essence is to explore the mode of threat construction and fear generation in the discourse space and hence arouse the hearers' fear so as to help people accept the legitimization of strategies that eliminate threats and fears (Cap, 2017).

2.2 The Analytical Framework

As a forced construal operation that arouses the imminence sense of the internal threat and seeks to legitimize measures, Proximization Theory emphasizes that in the discourse space, the peripheral entities, also called the outside-deictic-center (ODC), gradually approach the inside-deictic-center (IDC) and cause harms to them. The ODC here has three types of features which are spatial, temporal and axiological features: Spatial Proximization, Temporal Proximization and Axiological Proximization. The analytical framework of Proximization Theory is called STA Model: Spatial-Temporal – Axiological Model.

The spatial proximization refers to the actual invasion of outside-deictic-center to inside-deictic-center in the physical discourse space. The temporal proximization concentrates on the simultaneous approach of past and future moments to the present moments. Through analogy, it often links the past catastrophic events and increasingly serious future trends with the current situation, creating a passive situation in the present and calling on hearers to take immediate actions to give active responses to the threats that have already happened or are imminent. The axiological proximization means that in the discourse space, the outside-deictic-centers continuously have a conflict with the inside-deictic-centers due to different ideologies, and the passive ideologies of the outside-deictic-centers have impacts on the inside-deictic-centers. To clearly represent the proximization strategies in the discourse, Cap proposes the respective lexical-grammatical and discourse items in the three proximization strategies. More details will be presented in Table 1.

Table 1Key lexical-grammatical and discourse items of three facets of proximization framework (Cap, 2013:109-122)

Proximization	Category
Spatial Proximization	Noun phrases construed as elements of the deictic center of the DS (discourse space)
	Noun phrases construed as elements outside the deictic center of the DS
	Verb phrases of motion and directionality construed as markers of movement of ODCs towards the deictic center
	Verb phrases of action construed as markers of the impact of ODCs upon IDCs

	Noun phrases denoting abstract concepts construed as anticipations of the impact of ODCs upon IDCs
	Noun phrases denoting abstract concepts construed as effects of the impact of ODCs upon IDCs
Temporal Proximization	Noun phrases involving indefinite descriptions construing ODC actual impact acts in alternative temporal frames
	Discourse forms involving contrastive use of the simple past and the present perfect construing threatening future extending infinitely from a past instant
	Noun phrases involving nominalizations construing presupposition of conditions for ODC impact to arise anytime in the future
	Verb phrases involving modal auxiliaries construing conditions for ODC impact as existing continually between the now and the infinite future
	Discourse forms involving parallel contrastive construals of oppositional and privileged futures extending from the now
Axiological Proximization	Noun phrases construed as IDC positive values or value sets (ideologies)
	Noun phrases construed as ODC negative values or value sets (ideologies)
	Discourse forms no longer than one sentence or two consecutive sentences involving the linear arrangement of lexical-grammatical phrases construing materialization in the IDC space of the ODC negative ideologies.

As mentioned above, so far, Proximization Theory has been widely used in various kinds of discourse analysis, such as immigration discourse (Wu & Niu, 2018), media stance (Zhou, 2021), anti-epidemic discourse (Yao, 2021), poverty alleviation discourse (Wang & Zhang, 2022) and environmental and cyberspace discourse (Cap, 2019). In terms of environmental discourse analysis, Cap (2017: 41-52) views the climate change discourse as the research object and adopts NATO Secretary-General Anders Fogh Rasmusseo's 2009 speech concerning climate change as the research data. Utilizing Proximization Theory, Cap analyses the discursive strategies about how Rasmusseo converts climate change into a global threat in this speech and calls on the world to take immediate action. Through the qualitative analysis, Cap finds that climate change discourse has two characteristics: Firstly, the number of potential ODCs in the climate change discourse is higher than that in the health and political discourse. Secondly, the climate change discourse concentrates more on axiological proximization strategies. Different discourses may have various proximization strategies. Therefore, in constructing the discourse of the environmental pollution crisis of chemicals represented by *Silent Spring*, several questions are worthy of further exploration about the way how the author constructs the threats and harms of chemicals like pesticides to environmental security and whether *Silent Spring* has the same proximization strategies with those of climate change discourses. Therefore, this paper attempts to investigate the threat construction and fear generation model in *Silent Spring* from the perspective of Proximization Theory, and the specific proximization strategies will be presented in lexico-grammatical forms in a quantitative way.

3. Methodology

3.1 Research Questions

Based on what has been discussed, the paper tries to propose two questions concerning the proximization strategies in *Silent Spring*.

1. In *Silent Spring*, how does the writer construct the environmental crisis caused by chemicals, and what are the proximization strategies utilized in this book?
2. If the proximization strategies in environmental crisis discourse caused by chemicals are the same as those in climate change discourse? Or whether the two discourses have their own proximization features?

3.2 Research Method

The linguistic data analyzed in this paper comes from a popular science book *Silent Spring* written by famous American writer Rachel Cason in 1962. *Silent Spring* mainly describes the fact that the extensive use of chemicals has caused great harm to the

environment and also threats to people's normal life. The total amounts of the corpus in *Silent Spring* are up to 83690 tokens. For the method of data analysis, the paper will combine the quantitative analysis with the qualitative analysis. And the quantitative analysis needs the help of a corpus tool named Wmatrix (https://ucrel.lancs.ac.uk/wmatrix), which is a web-based analysis developed by Paul Rayson and his team from the Corpus Research Center at Lancaster University, UK. This corpus analysis tool can automatically annotate corpus semantic domains according to its own semantic annotation tool USAS (UCREL Semantic Annotation System). Besides, this corpus tool contains the British National Corpus (BNC) as its reference corpus. According to the distributions of corpus semantic domains and the concordances of lexical-grammatical contents in domains provided by Wmatrix, the paper will classify the semantic domains and lexical-grammatical items into three proximization perspectives: space, time and axiology and also discuss the representative examples in each proximization strategy. At last, based on what will be discussed, the paper attempts to answer the two questions raised above.

4. Results

The content of *Silent Spring* will be cleaned and converted into the format of txt. Then the list of semantic domains of *Silent Spring* will be represented by Wmatrix. Table 2 shows more details about the first fifteen semantic domains in *Silent Spring*.

Table 2 The first fifteen Semantic Domains in *Silent Spring*

Item	O1	%1	O2	%2	LL	Content
L2	2133	2.55	3225	0.33	4129.54	Living creatures: animals, birds, etc.
O1	785	0.94	689	0.07	2051.22	Substances and materials generally
B2-	647	0.77	1275	0.13	1031.43	Disease
F4	508	0.61	912	0.09	871	Farming & Horticulture
Z99	3125	3.73	22165	2.29	580.01	Unmatched
W5	221	0.26	225	0.02	537.88	Green issues
L3	659	0.79	2439	0.25	533.97	Plants
Y1	359	0.43	778	0.08	528.35	Science and technology, in general
A1.1.2	346	0.41	815	0.08	472.27	Damaging and destroying
L1+	142	0.17	93	0.01	418.82	Alive
L1-	442	0.53	1585	0.16	374.38	Dead
W3	717	0.86	3466	0.36	371.96	Geographical terms
A13	73	0.09	0	0	369.57	Degree
E3-	438	0.52	1647	0.17	346.88	Violent/ Angry
A2.2	771	0.92	4362	0.45	283.29	Cause& Effect/Connection

In Table 2, the item represents the codes of the semantic domain. O1 and %1 represent the frequency and relative frequency of the corpus in *Silent Spring,* respectively, and O2 and %2 represent the frequency and relative frequency of the corpus in BNC Sampler Written, respectively. The logarithmic likelihood ration of LL indicates the significance of the corpus in the reference corpus. The last line represents the lexical items belonging to the semantic domain, and those lexical items will be listed according to the frequency of the corpus. For example, in the first semantic domain: living creatures: animal, birds, etc., there are 247 kinds of lexical-grammatical items, like insects, birds, fish, animals and wildlife and so on. Through the analysis of the concordance where the lexical-grammatical items appear, it can be found that those lexical-grammatical items belong to the creatures influenced by chemicals. They are the inside-deictic-centers IDCs, the internal entities in the deictic center which are invaded by the entities outside, belonging to the spatial proximation category. The second-ranked semantic domain: Substances and materials, generally have 54 kinds of lexical-grammatical items like chemicals, pesticides, materials and so on. Through analysis, it can be found that most of the lexical-grammatical items in this semantic domain describe chemicals like insecticides which cause great harm to the environment. This semantic domain describes the content about the origin of environmental crisis in the discourse, and hence it also belongs to the spatial proximation category. However, not all the lexical-grammatical items in the same semantic domain

belong to the same proximization strategy. For example, the ninth-ranked semantic domain: Damaging and destroying, contains three proximization categories (space: victims; time: destroyed; axiology: harm, destruction). Therefore, when analyzing the proximization strategy to which lexical-grammaticl items belong, the paper needs to consider the lexical-grammatical items and also the context where the items appear and then the proximization category can be determined. In the next part, combining with the semantic domains and lexical-grammatical items provided by Wmatrix (the top 50 semantic domains and lexical-grammatical items in these semantic domains), the paper will analyze the discursive proximization strategies of chemicals-induced environmental crisis in *Silent Spring* from three perspectives: space, time and axiology.

4.1 Spatial Proximization
Spatial proximization refers to the process of continuous invasion of ODC into IDC in the physical discourse space. According to Table 1, there are six kinds of lexical-grammatical items in the spatial proximization. Through the combination of the semantic domains and lexical-grammatical items and their contexts, the paper will select several representative lexical-grammatical items in the spatial proximization strategies in *Silent Spring*. Table 3 shows partial semantic domains related to spatial proximization in Wmatrix.

Table 3 The Sematic Domains Related to Spatial Proximization in *Silent Spring* (Partial)

Item	01	%1	02	%2	LL	Content
L2	2133	2.55	3225	0.33	4129.54	Living creatures: animals, birds, etc.
O1	785	0.94	689	0.07	2051.22	Substances and materials generally
B2-	647	0.77	1275	0.13	1031.43	Disease
F4	508	0.61	912	0.09	871	Farming & Horticulture
Z99	3125	3.73	22165	2.29	580.01	Unmatched
W5	221	0.26	225	0.02	537.88	Green issues
L3	659	0.79	2439	0.25	533.97	Plants
Y1	359	0.43	778	0.08	528.35	Science and technology, in general
E3-	438	0.52	1647	0.17	346.88	Violent/Angry
A2.2	771	0.92	4362	0.45	283.29	Cause & Effect/Connection

Most lexical-grammatical items in the fifth semantic domain in the table: unmatched, are the names of chemical insecticides like DDT, dieldrin, heptachlor and others. In *Silent Spring*, it is the extensive use of these chemicals that causes irreversible harm to the environment, and hence all these insecticides belong to the ODC that invades internal entities in the discourse space. Based on this kind of analysis, the lexical-grammatical items in the spatial proximization strategy in *Silent Spring* can be obtained. Table 4 shows more lexical-grammatical items in the spatial proximization in *Silent Spring*.

Table 4 The Lexical- grammatical Items in Spatial Proximization in *Silent Spring*

Category	Project	Frequency
Noun phrases construed as elements of the deictic center of the DS (discourse space)	insects, birds, fish, animals, wildlife, agriculture, livestock, nature, food, population/ children	0.97%
Noun phrases construed as elements outside the deictic center of the DS	chemicals, pesticides, DDT, insecticides, dieldrin, people, human beings, United States	1.03%
Verb phrases of motion and directionality construed as markers of movement of ODCs towards the deictic center	become/became, developed/develop, interfere, grow/grown, spread, spray	0.37%
Verb phrases of action construed as markers of impact of ODCs upon IDCs	contaminated, kill, cause, produce, affected, occur	0.25%
Noun phrases denoting abstract concepts construed as anticipations of the impact of ODCs upon IDCs	danger, damage, destruction, harm, threat	0.18%

Noun phrases denoting abstract concepts construed as effects of the impact of ODCs upon IDCs	malignancy, effect, disaster, consequences, disease, cancer	0.37%

In *Silent Spring*, insects, wildlife, agriculture, livestock, food and children are seen as internal entities in the discourse space threatened by external harms. And these threats and harms originate from chemical insecticides, such as DDT and dieldrin. Those insecticides were used to address issues such as the natural plague of insects, but their overuse has caused irreversible consequences to the environment. The following part will explain how chemical pesticides invade internal entities and cause harm through the use of lexical-grammatical items.

(1) Is it a coincidence, then, that benzene hexachloride and its relative, lindane, are known through repeated observations to double the chromosomes in experimental plants and that these same chemicals have been implicated in many well-documented cases of fatal anemias? And what of the many other pesticides that **interfere** with cell division, break chromosomes, and cause mutations?

Hexachlorobenzene and lindane compounds in chemical pesticides have been experimentally shown to double plant chromosomes. And they also interfere with plant cell division, destroy chromosomes, and cause plant genetic mutations. Besides, they also associate with many fatal anemias. These chemical compounds constantly affect the plants in the spatial space by interfering with their normal growth process and causing substantial damage.

(2) These sprays, dust, and aerosols are now applied almost universally to farms, gardens，forests, and homes-nonselective chemicals that have the power to **kill** every insect, the " good " and the " bad, " to still the song of birds and the leaping of fish in the streams, to coat the leaves with a deadly film, and to linger on in soil all this though the intended target may be only a few weeds or insects.

In order to eliminate certain harmful insects, chemical pesticides are spayed haphazardly on farms, gardens, and forests, but the harmful chemical compounds indiscriminately kill all insects that appear where the chemical pesticides are sprayed. In addition, excessive use of pesticides affects other creatures in the same environment that birds no longer sing, fish no longer swim, and leaves cannot breathe freely. The adverse effects that chemical pesticides bring outweigh the positive effects3.

(3) Ever since chemists began to manufacture substances that nature never invented, the problems of water purification have become complex, and the **danger** to users of water has increased. As we have seen, the production of these synthetic chemicals in large volumes began in the 1940s. It has now reached such proportions that an appalling deluge of chemical pollution is daily poured into the nation's waterways.

In recent years, chemists have always been creating new compounds, including chemical pesticides, to promote development. These chemical compounds are discharged into the water, and through the ecological cycles, those harmful compounds in them are absorbed by the animals, plants and people in the whole environment little by little, causing irreversible damage to them. Those chemical pesticides invade the water system in the physical space, which poses a great threat to the environment and people in the inner deictic center.

(4) Still, other pesticides will be added as we include those whose action on living tissues or cells may be considered an indirect cause of **malignancy**. One of the earliest pesticides associated with **cancer** is arsenic, occurring in sodium arsenide as a weed killer and in calcium arsenate and various other compounds as insecticides.

In *Silent Spring*, it mentions that some pesticides are the indirect causes of malignancy in living tissues or cells. Besides, arsenic can be synthesized as a pesticide with calcium arsenate and other substances, and it is a leading cause of cancers, posing severe threats to human health. In summary, the writer Cason flexibly uses spatial proximization strategies. She adopts various kinds of lexical-grammatical items to reveal the fact that chemical insecticides have caused harm to all the creatures in the environment. Now, the ecological system is almost being collapsed, and human people's safety is being threatened. Therefore, attaching importance to environmental changes and maintaining a peaceful home for humans need to be given more attention.

4.2 Temporal Proximization

Based on the semantic domains and their lexical-grammatical items provided by Wmatrix, the paper summarizes the suitable expressions of lexical-grammatical items related to the temporal proximization in *Silent Spring*. More details will be presented in Tables 5 and 6.

Table 5 The Semantic Domains Related to Temporal Domains in *Silent Spring* (Partial)

Item	O1	%1	O2	%2	LL	Content
L1-	442	0.53	1585	0.16	374.38	Dead
E3-	438	0.52	1647	0.17	346.88	Violent/Angry
A15-	173	0.21	370	0.04	257.54	Danger
A2.1+	627	0.75	3939	0.41	173.90	Change
Y1	359	0.43	778	0.08	528.35	Science and technology in general
N5+	654	0.78	4457	0.46	140.09	Quantities: many/much

Table 6 The Lexical-grammatical Items in Temporal Proximization in *Silent Spring*

Category	Project	Frequency
Noun phrases involving nominalizations construing presupposition of conditions for ODC impact to arise anytime in the future	Death, attack, poison, change, exposure, radiation, infestation...	0.31%
Verb phrases involving modal auxiliaries construing conditions for ODC impact as existing continually between the now and the infinite future	Would/could/can/should/may/might/must	0.91%
Discourse forms expressing perfect tense to construct the infinite extension of fear from past events.	Have/has/had done/been ...	1.2%

Through the analysis of semantic domains and their lexical items, there are three types of expressions of temporal proximization strategies. In Table 6, the first two expressions are the same as Cap's proposed lexical-grammatical items. Based on the features of the text, the paper puts forward a new lexical-grammatical expression of temporal proximization: the use of perfect tense. In *Silent Spring*, Carson often utilizes the perfect tense to highlight the infinite harm that the past time has done to the present and the future.

(5) Since DDT was released for civilian use, a process of escalation **has been going on** in which ever more toxic materials must be found. This **has happened** because insects, in a triumphant vindication of Darwin's principle of the survival of the fittest, **have evolved** super races immune to the particular insecticide used; hence a deadlier one **has always to be** developed–and then a deadlier one than that.

Since the repeated use of chemical pesticides, some pests have already produced immune antibodies and then more toxic chemical pesticides are needed to eliminate those pests with antibodies. Therefore, this kind of circulation has come into being that people need to produce more toxic chemical pesticides to deal with pests with more antibodies. Temporally, the circulation produces more toxic chemical pesticides, harming the current environment. The repeated use of perfect tense emphasizes how long the effect of chemical pesticides last. In addition to the flexible use of perfect tense expressions that reflect the influences of the past on the present, Carson also adopts various kinds of modal particles, which also emphasize the fact that the influence of ODC on IDC will continue.

(6) Or the hay, containing residues of 7 to 8 parts per million, may be fed to cows. The DDT **will** turn up in the milk in the amount of about 3 parts per million, but in butter made from this milk, the concentration may run to 65 parts per million.

When cows are fed hay containing chemical residues, the amount of DDT is about three parts per million in cows. And when butter is made from milk from those kinds of cows, the amount of DDT can reach 65 parts per million. With the extension of the food chain, the time DDT stays in the world outside and also its contents are increasing. The harm of insecticides to the environment and human health is becoming more obvious too. Therefore, it is increasingly important to adopt new measures to protect the environment, like raising environmental awareness. Besides choosing the grammatical items expressing the harms of insecticides to the environment, Carson also focuses on lexical choices, which also reveal the potential threats of ODC to IDC in the future.

(7)   Or the hay, containing residues of 7 to 8 parts per million, may be fed to cows. The DDT **will** turn up in the milk in the amount of about 3 parts per million, but in butter made from this milk, the concentration may run to 65 parts per million.

The writer Carson notes that farmers find that nowadays, it is difficult to provide their cows with hay without being contaminated with chemicals. In addition, toxic compounds are found in breast milk, which means that breastfed babies may also have certain toxic compounds in their bodies. Those toxic compounds have already entered the whole environment and human bodies in various forms. With time increasing, those compounds will accumulate, hence threatening the environment and people's health. If effective measures were not adopted, chemical pesticides would continue to endanger nature, and eventually, human beings will always be the victims.

4.3 Axiological Proximization
Based on the semantic domains provided by Wmatrix, the paper lists several semantic domains and lexical-grammatic items related to the axiological proximization in *Silent Spring*. The details will be presented in Table 7.

Table 7 The Semantic Domains Related to Axiological Proximization in *Silent Spring* (Partial)

Item	O1	%1	O2	%2	LL	Content
W5	221	0.26	225	0.02	537.88	Green Issues
L1+	142	0.17	93	0.01	418.82	Alive
A5.2+	196	0.23	779	0.08	142.87	Evaluation: true
B4	151	0.18	883	0.09	51.04	Cleaning and personal care
A15+	44	0.05	166	0.02	34.68	Safe
B2-	647	0.77	1275	0.13	1031.43	Disease
A1.1.2	346	0.41	815	0.08	472.27	Damaging and destroying
L1-	442	0.53	1585	0.16	374.38	Dead
A15-	173	0.21	370	0.04	257.54	Danger
A5.1---	59	0.07	54	0.01	151.22	Evaluation: Bad
N3.5+	38	0.05	113	0.01	40.74	Weight: Heavy

According to the context where the lexical-grammatic items appear, the paper presents a few lexical-grammatical items in axiological proximization in *Silent Spring*. More details will be listed in Table 8.

Table 8 The Lexical-grammatical Items in Axiological Proximization in *Silent Spring*

Category	Project	Frequency
Noun phrases construed as IDC positive values or value sets (ideologies)	Conservation, life, truth, credibility, sanitation, safety	0.11%
Noun phrases construed as ODC negative values or value sets (ideologies)	Contamination, illness, symptoms, pollution, destruction, eradication, mortality, extinction, sterility	0.19%
Discourse forms expressing negative evaluations of ODC's impact on IDC	Lethal, dangerous, fatal, disastrous, heavy, catastrophic, worst, monstrously	0.17%

In *Silent Spring*, in comparison to the positive ideologies of IDC, Carson tends to present ODC's negative ideologies, which are shown through the influence of chemical insecticides on the environment.

(8)   Potato soils have been found to contain up to 15 pounds of DDT per acre, and corn soils up to 19. A cranberry bog under study contained 34.5 pounds to the acre. Soils from apple orchards seem to reach the peak of **contamination,** with DDT accumulating at a rate that almost keeps pace with its rate of annual application.

(9)   It would be tragic to lose the elms, but it would be doubly tragic if, in vain efforts to save them, we plunge vast segments of our bird populations into the night of **extinction.**

Because the toxic compounds in chemical insecticides cannot be quickly degraded in the soil, the residual toxic substances in the soil are gradually increasing with the continuous spraying of chemical pesticides, which is undoubtedly a major blow for plants absorbing nutrients from the soil. In addition, the elm trees planted in the streets of the United States are poisoned by pests and other diseases. However, if large amounts of pesticides have been used to drive away those pests, the birds relaxing on these elm trees will also be affected. Toxic chemical compounds will not only make those birds homeless but also expose them to the possibility of extinction. The reason why the writer Carson adopts those vocabularies is to highlight the serious impacts of those toxic chemicals on nature and also to point out the fact that it is urgent to take new measures to protect our environment. Besides the lexical items of ODCs' negative ideologies, Carson also makes use of various negative expressions to evaluate the impact of ODCs on IDCs.

(10) In the spring, the robins return to provide another link in the cycle. As few as 11 large earthworms can transfer a **lethal** dose of DDT to a robin. And 11 worms form a small part of a day's rations to a bird that eats 10 to 12 earthworms in as many minutes. Not all robins receive a **lethal** dose, but another consequence may lead to the extinction of their kind as surely as fatal poisoning.

Under the hierarchical transmission of the biological chain, the DDT left in the soil will be absorbed by earthworms, and then, the earthworms will be used as food for robins, the place which DDT enters at last. Although having been pasted several times, these DDTs are still lethal to robins. Those chemical insecticides, although with the original intention to eliminate insects, now actually enter into most parts of nature and seriously affect the natural ecosystem and disrupt the normal growth of all living creatures.

5. Conclusion

Based on Cap's (2013) STA Model in Proximization Theory and utilizing the semantic domains provided by the corpus tool Wmatrix, the paper investigates the discursive strategies in *Silent Spring* of how chemical insecticides cause harm to the environment from three perspectives of space, time and axiology. The paper shows that in *Silent Spring*, the frequency of spatial proximization strategies is about 3.17%, the frequency of temporal proximization strategies is about 2.48%, and the axiological proximization strategies are about 0.47%. In terms of spatial proximization strategies, the writer of *Silent Spring,* Carson, stresses the substantial harm caused by chemical pesticides to the environment and also points out the fact that chemical insecticides have influenced the normal growth of plants and other living creatures. The flexible use of spatial proximization strategies lays the foundation of temporal proximization strategies. With the actual harms of chemical insecticides mentioned in the spatial proximziation, the temporal proximization combines the severe impacts caused by insecticides in the past with the increasingly serious developing potential to highlight the current situation and stress the urgency of effective measures to protect the environment. And in terms of axiological proximization, it emphasizes the conflict of ideologies between ODCs and IDCs. *Silent Spring* describes more about the ODCs' negative ideologies and also negative evaluations of ODCs' impacts on IDCs. Compared with the features of climate change discourse proposed by Cap (2017), the proximization strategies of environmental discourse about chemicals in *Silent Spring* have the following features: 1. *Silent Spring* pays attention to the expression of spatial proximization, which emphasizes the actual impacts of ODCs on IDCs and also the facts about the physical invasion of ODCs to IDCs. 2. *Silent Spring* prefers the expressions of perfect tense to stress the longitude of the influence of chemical insecticides on nature. 3. *Silent Spring* utilizes the evaluations of the harms of chemicals to reflect the conflicts of the ideologies between ODCs and IDCs.

The paper tentatively combines Proximization Theory with Corpus Tool Wmatrix to analyze the discursive proximization strategies of the environmental discourse of chemicals in the case of *Silent Spring*. But the process of corpus analysis may still be affected by subjective interference (such as the classifications of categories of lexical-grammatical items). Therefore, the paper still has its flaws, and more rational and objective data analysis methods are needed for further deeper investigation of environmental discourses.

Publisher's Note: All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers.

References

[1] Cap, P. (2010). Axiological aspects of proximization. *Journal of Pragmatics*, 42, 392-407.

[2] Cap, P. (2013). *Proximization: The pragmatics of symbolic distance crossing*. Amsterdam: John Benjamins.

[3] Cap, P. (2014). Applying cognitive pragmatics to critical discourse studies: A proximization analysis of three public space discourses. *Journal of Pragmatics*, 2014, 70, 16-30.

[4] Cap, P. (2017). The language of fear: Communicating threat in public discourse. London: Palgrave Macmillan.

[5] Song, J. N. (2019). A proximal perspective to legitimization of critical discourse interpretation. *Modern Foreign Languages, 42* (04), 475-486.

[6] Wu, J. G., Lin, J. R., & Li, Y. (2016). A new method of critical discourse analysis-Proximization. *Journal of Foreign Languages, 39* (05), 75-82.

[7] Wu, J. G., & Niu, Z. J. (2018). Analyzing legitimization in political discourse from the perspective of proximization theory: A case study of Trump's immigration policy. *Foreign Languages in China, 15* (06), 48-53.

[8] Wang, Z., & Zhang, H. (2022). A critical cognitive linguistic study of Chinese poverty alleviation discourses in Chinese and western media form the perspective of triangulation. *Foreign Language Education, 43*(06), 15-21.

[9] Yao, Z. M. (2021). Discursive construction of community in combating COVID-19 from the perspective of proximization theory. *Foreign Studies, 9*(03), 42-48+ 107-108.

[10] Zhang, H., Lin, Z. J., & Dong, X. M. (2021). The proximization study of in ecological discourse of climate change in Chinese and US news reports. *Journal of Xi'an International Studies University, 29* (01), 35-40+ 128.

[11] Zhang, H., & Yan, B. (2019). A critical cognitive linguistic analysis of political conflict discourses: A case study based on discourse of Syrian War. *Foreign Languages and Their Teaching*, (04), 14-27+146.

[12] Zhang, H., & Yang, Y. Q. (2019). Critical cognitive linguistics: Theoretical foundations and its current research. *Foreign Language Education, 40* (03), 1-11.

[13] Zheng, H. Z. (2022). *Silent Spring* and the Rise of the modern environmental movement: the 60th Anniversary of Rachel Carson's Book. *Journal of Fujian Normal University (Philosophy and Social Sciences Edition)*, (04), 20-29+ 169.