| **RESEARCH ARTICLE**

An Ideational Intersemiotic Analysis of Ecological Discourses in China's English Textbooks

Yu Huang

College of Foreign Studies, Jinan University, Guangzhou, China

| **ABSTRACT**

Textbooks not only present knowledge but also pass on positive values. In the series of junior high school English textbooks published by Shanghai Education Press (SEP), there are quite a few multimodal discourses that convey positive ecological values. Based on the intersemiotic complementarity, this study made a multimodal discourse analysis of the ecological discourses in those junior high school English textbooks, aiming to explore how images and texts were combined to construct ecological ideational meanings and convey positive ecological values. The results showed that there existed three types of ecological values, which were living with animals and plants in harmony, saving resources and stopping pollution. Images and texts interacted and formed five types of relations, which were repetition, synonymy, antonymy, hyponymy and collocation. Through these relations between the images and the texts, the ecological ideational meanings were constructed and the positive ecological values were well conveyed.

| **KEYWORDS**

junior high school English textbooks; multimodal discourses; ecological values; intersemiotic complementarity

| **ARTICLE INFORMATION**

1. Introduction

In China, moral education has been an essential part of school education for centuries. Positive values are mainly conveyed through all curricula. As one of the compulsory subjects, English also plays a significant role in cultivating students' moral character and promoting their personal growth. In English courses, all the teaching and learning revolve around English textbooks. These textbooks not only present English knowledge but also pass on positive values to students. In recent years, there has been an increase of scholarly interest in domestic junior high school English textbooks. Yin & Gao (2018) explored the ways of understanding and using junior high school English textbooks from the perspective of effective teaching. Based on the classification of the theme contents of English textbooks in English Curriculum Standards for Compulsory Education (2022 Edition) (Ministry of Education of People's Republic of China, 2022), Zheng & Ni (2022) conducted a comparative study on the distribution of Chinese cultural elements in all types of themes among four series of EFL textbooks for middle-school students. The results indicated a significant similarity in the distribution of Chinese cultural elements in four series in terms of theme types and a strong correlation to students in terms of contents. Ou et al. (2022) explored the moral educational values embodied in nine excellent foreign literature works introduced in primary school English textbooks published by People's Education Press (PEP) and junior high school English textbooks. Through a case study, Zou & Chen (2023) studied how English teachers in middle schools cultivated students' thinking qualities with English textbooks. They found the teachers helped develop students' thinking mainly through deleting the kind of exercises of completing sentences or passages, adding the kind of exercises of analyzing texts as well as creating real situational activities.

However, most of the related studies were centred on English knowledge or cultural elements in textbooks. Only a few focused on positive values conveyed through junior high school English textbooks, and research on the positive values of ecology embodied in English textbooks is still lacking. In fact, According to English Curriculum Standards for Compulsory Education (2022 Edition), the theme Human and Nature has become one of the three major themes of contents of English textbooks. Nowadays, on the path to achieve Chinese modernization, our country has paid more attention to the ecology. The concept of human living

with nature in harmony represents the new ecological view of China. Therefore, it is of great importance to study the positive values of ecology in English textbooks. In this study, the writer aims to explore the positive values of ecology embodied in the part of Human and Nature in SEP junior high school English textbooks, with the hope of helping English teachers guide students to cultivate positive ecological values in their daily teaching. Two research questions are put forward as follows:
1. What types of positive ecological values are presented in the ecological discourses in SEP junior high school English textbooks?
2. How the positive ecological meanings and values are constructed through the interactions between text modality and image modality?

2. Theoretical framework

Discourse analysis has received much attention from scholars since it was first put forward by the American linguist Harris at the beginning of the 1950s. Language is the main research subject in traditional discourse analysis. However, multimodal discourse analysis has attracted more attention from scholars from various fields after the publications of O' Toole's (1994) The Language of Displayed Art and Kress & van Leeuwen's (1996) Reading Images: the Grammar of Visual Design. Differing from discourse analysis, multimodal discourse analysis emphasizes the roles of other modalities besides language in conveying meaning, such as images, sounds, videos and so on. It can be employed to analyse various types of semiotic systems, like music, movies, and visual designs. According to Zhu (2007), modality refers to the sensor channels as well as the media of communication, including all types of semiotic systems. Hence, there exist two standards for judging whether a discourse is a multimodal discourse. The first is the number of modalities that people use when dealing with a discourse. If a discourse requires the employment of two or more than two sensor channels of people, then it can be regarded as a multimodal discourse. The other standard is the number of semiotic systems. A discourse with two or more semiotic systems is also seen as a multimodal discourse.

In the field of multimodal discourse analysis, scholars have made great efforts to explore the relationship between modalities and to study how different modalities work together to convey meanings. Referring to Kress & van Leeuwen's (1996) visual grammar, Royce (2013) proposed the theory of intersemiotic complementarity based on Halliday's (1985) Systemic Functional Linguistics, aiming to explore the relationship between modalities, especially the relationship between the text modality and the image modality. In total, this theory includes three types of intersemiotic complementarity in accordance with the three meta-functions of language in functional linguistics, which are respectively ideational intersemiotic complementarity corresponding to ideational function, interpersonal intersemiotic complementarity corresponding to interpersonal function and compositional intersemiotic complementarity corresponding to the textual function. The ideational intersemiotic complementarity is put forward to help analyze how text modality and image modality interact and thus convey the ideational meaning, which represents people's experience of the real and imaginary world. Six types of relations between text modality and image modality are identified, including repetition, synonymy, antonymy, hyponymy, meronymy and collocation. According to Royce (2013), visual message elements should be first recognized in order to find out how text and image modalities work to convey ideational meaning. Visual message elements can be divided into participants, activities, circumstances and attributes. After the recognition of visual elements, a check should be done to see whether there exists a relationship mentioned above between the vocabulary in the texts and the visual elements. Chinese junior high school English textbooks contain a great number of multimodal discourses since the contents are presented through texts accompanied by colorful pictures. However, there are few studies exploring the ideational meaning construction in these English textbooks from the perspective of intersemiotic complementarity. Thus, with the aim mentioned above, this study tries to explore how positive ecological values and meanings are constructed through the interactions between text modality and image modality in the ecological discourses in SEP junior high school English textbooks.

3. Data and methodology

The series of junior high English textbooks published by Shanghai Education Press was selected as the data source in this study since they have been found to include the most units about ecology among eight official series of Chinese junior high English textbooks in Xu's (2023) dissertation. Considering the completeness of information presented, the writer selected the reading materials related to ecology as the ecological discourses and made a classification of the positive ecological values reflected in those discourses. Drawing upon Royce's (2013) ideational intersemiotic complementarity, this study conducted a multimodal discourse analysis of the ecological discourses selected to explore how different types of positive ecological meanings and values were constructed through the interactions between text modality and image modality. The visual elements of every discourse selected were first recognized. Then the writer continued to check the existence of relations between the texts and the visual elements identified and confirmed the types of their relations, which could help illustrate the construction of positive ecological meanings and values in these discourses.

4. Multimodal analysis of ecological discourses

This study singled out all the units related to ecology from six English textbooks published by Shanghai Education Press and the specific results are shown in Table 1.

Table 1 The number and distribution of ecological texts and related images

Units	Location	Number of texts	Number of images
The Earth	Grade 7 Book 1	2	6
Our animal friends	Grade 7 Book 2	2	8
Save the trees	Grade 7 Book 2	2	3
Water	Grade 7 Book 2	2	2
Electricity	Grade 7 Book 2	2	3
Save the endangered animals	Grade 8 Book 2	4	7
Pets	Grade 8 Book 2	4	9
The environment	Grade 9 Book 2	3	6
Total		21	44

From Table 1, we can see eight units are found to be related to ecology in total, with Grade 7 textbooks having the most units and Grade 9 textbooks the fewest. As for the number of texts and images, 21 texts and 44 images are recognized altogether. Specifically, in every unit, there are at least 2 ecological texts and these texts mainly come from the parts of Reading, Practice and Cultural corner. Obviously, the number of images is relatively larger than that of texts, which means one text might be accompanied by more than one image. This also indicates the importance of images in constructing positive ecological meanings and values. As for the contents of these texts selected, they mainly focus on the relationship between humans and animals, plants as well as the natural resources. According to the various contents of the units selected, the writer continued to classify these units on the basis of the ecological themes reflected. The results are presented in Table 2.

Table 2 The classification of the units selected

Themes	Units	Number of texts	Number of images
Living with animals and plants in harmony	Our animal friends Pets Save the endangered animals Save the trees	12	27
Saving resources	Water Electricity	4	5
Stopping pollution	The Earth The environment	5	12
Total		21	44

Table 2 shows that the eight units selected are divided into three themes, which are respectively living with animals and plants in harmony, saving resources and stopping pollution. Obviously, the number of related texts and images in the theme of living with animals and plants in harmony is the largest while that in the theme of saving resources is the smallest. The distribution indicates that this series of English textbooks place more emphasis on guiding middle school students to form a harmonious relationship with animals and plants. In the following section, three specific ecological multimodal discourses will be selected−one from each theme−and analyzed as examples to examine how the positive ecological meanings and values are constructed and conveyed to students.

4.1 Living with animals and plants in harmony
Figure 1 is an ecological discourse in which the title of the text is The Giant Panda. It was selected from the *Reading* part of the unit *Save the Endangered Animals* in Grade 8. This multimodal discourse consists of one complete text and three accompanying images. The contents of the text are mainly about basic information of pandas, including their living places, food, daily behaviors as well as their life spans. In the concluding part of the text, students are appealed to protect these cute pandas.

Figure 1 A multimodal discourse in the theme Living with animals and plants in harmony

Drawing upon Royce's (2013) intersemiotic complementarity, the writer identified the visual elements of the images first. In total, there are four participants in these three images, which are the main participants: pandas, bamboo, fallen trees and a big stone. From the images, we can easily see that one panda is lying on the stone, one is walking on the fallen trees and another is eating bamboo. Thus, three actions of pandas are extracted as lying, walking and eating. As for the circumstances, green grass, green trees and the ground are included. As the last kind of visual elements, attributes refer to any features or characteristics of the participants. When looking at the discourse at the first sight, students can easily be attracted by the black and white color of pandas. It is a major feature of the pandas. Another prominent feature of pandas in the images is their smiles, which implies that they are very happy in their home. Besides the cute pandas, the image satisfies the visual effect where we can see grass and trees that are green in color.

Analyzed through checking the existences of those vocabularies that have any of the relationships with images proposed in Royce's (2013) intersemiotic complementarity in terms of the ideational meaning conveyed, the discourse is found to contain two types of relations, including repetition and antonymy. The relation of repetition means that the ideational meanings presented in images are the same as the meanings embodied in the vocabularies. In this discourse, the relation of repetition exists between every type of visual elements and their corresponding vocabularies. Take the visual elements of participants as an example, the main participants pandas correspond exactly to the key vocabulary "pandas", which represents the content theme and thus is employed most frequently in the text. The smiles on pandas' faces, as well as the black and white appearances, not only show students the adorable characteristic of pandas, but also help arouse students' desire to see these cute pandas in person and protect those lovely pandas from being hurt. The relation of repetition also exists between the visual element of actions and the related vocabularies. The action of a panda's eating bamboo is in accordance with the verb phrase "eat bamboo" in the sentence "Pandas in the wild usually eat bamboo" and the sentence "A giant panda can eat as much as 30 kilograms of bamboo a day." As well as presenting the panda's eating habits vividly, this repetition reinforces the common knowledge that pandas mainly feed on bamboo, which is thus in contrast to the fact that people are cutting down trees shown in the last part of the text. In terms of the visual element circumstances, there is also the relation of repetition between the images and vocabularies. In the images, it is not hard to see the pandas sitting on the green grass or around them there are green trees. The visual elements trees correspond to those vocabularies "trees" and "the wild" in the texts. Although the vocabulary "the wild" doesn't directly correspond to trees, students can associate the wild with trees without efforts. This kind of repetition delivers the message that the pandas live happily in a quite good environment with green trees and grass, therefore we people should try our best to provide them with a good and comfortable environment.

Another type of relation is antonymy. In general, the relations of antonymy construct contrasts between the good and happy living conditions of the pandas shown in the images and people's destroying their homes or killing them for illegal profits, and thus arouse students' reflection about human's destroying behaviors and guide them to protect animals and their living environments and to live with them in harmony. In this discourse, two relations of antonymy can be found. The first relation of antonymy lies between the visual element of circumstances and the last part of the text. From the images, we can see the environment that the pandas live in are surrounded by green trees, and grass, so the pandas feel very cozy and relaxed in their homes. The comfortable environment is opposite to the fact presented in the last paragraph that people are cutting down trees. Teachers can lead students to pay more attention to this contrast and thus to reflect on human's destroying behaviors. The startling contrast can help middle school students to develop a harmonious ecological notion, that is, we humans shouldn't destroy the homes of animals and we should protect them and make their living places as good as humans'. The second is between the smiley faces of the pandas in the images and the expression "the pandas are losing their homes". It's obvious that the pandas look very happy in the images. They are having fun lying on the big stone, walking on the fallen trees and eating bamboo in their cozy

homes. However, the satisfying smiles on their faces are in contrast to the ideational meaning conveyedin the sentence "the pandas are losing their homes.". The pandas will definitely feel sad if they lose their homes or their living places. By making such a contrast vividly, the discourse arouses students' awareness of protecting pandas and offering them good living environments. Also, it encourages them to take actions to protect animals like pandas from being hurt. The positive ecological value that humans should respect animals and live with them harmoniously on the Earth is clearly conveyed to students in this discourse.

4.2 Saving resources

The multimodal discourse in Figure 2 comes from the part of *Culture corner* of the unit *Electricity* in Grade 7. It is a multimodal discourse with one complete text and one image. The text is a brief introduction of an energy-saving activity Earth Hour and it aims to raise students' environmental awareness and responsibility of saving resources and to encourage them to take actions to save electricity in their daily lives.

Figure 2 A multimodal discourse in the theme Saving resources

The visual elements recognized in the image are illustrated first. The visual elements of participants include one woman, two men, three burning candles and three trays. It's clear that people and the candles are the main participants. In the image, three people are holding three trays with burning candles on. Thus, two actions are extracted, one being people's holding the candles and the other being the candles' burning. The circumstances are composed of the shapes of humans' bodies, which delineate the real situation where only the shapes of humans can be seen with the light of candles. In fact, when the electric lights are all turned off, there won't be much light seen even the candles are on. The background is supposed to be black in color. However, in this image, the whole background is blue in color, attracting people's attention and evoking their thinking.

The positive ecological values are constructed through three types of relations between the text and the image, including synonymy, collocation, and hyponymy. The relation of synonymy exists between the action of three persons' holding candles and the verb phrase "turn their lights off". Earth Hour is an activity in which people turn off lights for an hour on the evening of the last Saturday of March every year, in order to save electricity and thus reduce the emissions of carbon dioxide. Due to the static features, images that just show the black scenes after all the lights are turned off cannot delineate completely the process of turning lights off as videos. However, the image showing people's holding candles can present this energy-saving process more vividly and thus help students better understand the content of the activity Earth Hour.

The second type of relation is collocation. It's a common sense that with the light of candles from a distance, we cannot see the whole appearance of one person but his shape. Therefore, the black shapes of people in the background collocate with the situation where lights are turned off in terms of the ideational meaning. And the positive ecological activity of turning off lights is emphasized and the positive ecological value of saving resources is conveyed. Besides the black shapes of humans, the blue background collocates with the theme of the text, which stresses environmental protection through saving energy. In the images taken from the real life, the background is supposed to be black in color since there is no light after the electric lights are off. However, in this multimodal discourse, a cartoon image is employed and the background is in the color of blue instead of black. The color blue is an eco-friendly color, which can always remind us of the the sunny sky and the clean oceans. It stands for peace and spotless cleanness, therefore, it is in accordance with the ecological theme of the text and helps arouse students' awareness and motivation to make a better living environment through saving resources.

In the analysis of word meaning, the relation of hyponymy refers to a sense relation between a more general word and a more specific word. However, in the analysis of multimodal discourses, the general and specific relations exist between the ideational meanings embodied in the visual elements and the images. In this discourse, the visual elements of participants, one woman and two men, are the hyponyms of the vocabulary "people" in the noun phrases "2.2 million people" and "people from all over the world". Only three persons can be seen taking part in the energy-saving activity Earth Hour in the image, however, the word "people" is used in the text, which enlarges the participants that are willing to make their contribution to saving energy and then

protecting the earth. In this way, students feel included in this activity and thus take the responsibiliy for saving energy and resources.

4.3 Stopping pollution

The multimodal discourse in Figure 3 was extracted from the *Reading* part of the unit *the Earth* in Grade 7. Although it is a paragraph of the whole text, it's accompanied by an independently corresponding image, which delineates the air pollution vividly, and one background image, which presents part of the Earth. The contents of this short discourse describe the facts that humans are polluting the environment first and then call on us to protect our beautiful Earth.

Figure 3 A multimodal discourse in the theme Stopping pollution

As it's seen in the main image, the tall buildings, the chimneys and the black smoke can be recognized as the visual elements of participants. And in the background image, the Earth is the only participant. There is only one visual element of actions in the main image, which is the black smoke going into the air. With regard to the circumstances, the sky in the orange color indicates the air pollution. In this image, the color of black is the dominant color and thus it is the attribute of smoke.

In total, four kinds of relations between the visual elements and the text are identified, collocation, synonymy, antonymy and repetition included. First of all, the relation of collocation exists between black smoke and the sentence "We burn things to make energy. " There is certainly black smoke when we burn things. The presentation of the thick black smoke in the image vividly shows the bad consequences of humans' burning behaviors and thus gives people a deep impression of air pollution caused by humans. Also, the following sentence "This pollutes the air." further illustrates the harm that the black smoke will bring to the environment, which can be understood as anther relation of collocation.

The only visual element of actions in the main image is correlated with the expression "This pollutes the air. " and together they form a relation of synonymy. From the main image, we can see the black smoke is going into the air from chimneys, but the verb "pollute" in the text clearly points out the harm of the smoke to the environment. The image with the text together highlights human's polluting behaviors and makes students reflect on the environmental problems.

The polluting behaviors inferred from the black smoke in the main image is just opposite to the urgent request delivered in the last two sentences "We must stop doing these things. It's important for us to protect the Earth for our future.", which forms a relation of antonymy. The startling contrast condemns human's polluting behaviors, but more importantly, it urges immediate actions to be taken to protect our Earth from being polluted and destroyed.

The relation of repetition is presented between the participants, the Earth in the background image and the noun in the last sentence, that is, "the Earth." We can see that the Earth in the background image takes up more than half the page and it's so big that we cannot ignore it. This overall arrangement indicates the great importance of the Earth to human beings and it passes on the positive ecological value that we humans must stop polluting the environment and make no efforts to protect the Earth, our living home. This value inferred from the background image is in accordance with the appeal in the last two sentences.

5. Conclusion

As the main carriers of English knowledge, SEP junior high school English textbooks also convey positive ecological values to students. Through a detailed analysis of all the ecological discourses in the textbooks , the writer concluded three ecological themes implied in these discourses, which were living with animals and plants in harmony, saving resources and stopping pollution. Drawing upon Royce's (2013) intersemiotic complementarity, the writer made analyses of how the positive ecological ideational meanings were constructed in three specific discourses. The results showed that the positive ecological meanings and values were mainly constructed and conveyed through various types of relations between images and texts. In the multimodal discourse *The Giant Panda*, the ecological value of protecting animals and their homes was conveyed mainly through two types of relation, the relation of repetition and the relation of antonymy. In the multimodal discourse *Earth Hour*, the relations of synonymy, collocation and hyponymy between images and texts together constructed the ecological meaning of saving energy and resources. In the

multimodal discourse *Protect the Earth*, the relations of collocation, synonymy, repetition and antonymy between two images and the text called on people to stop polluting the environment and to take action to protect the Earth. The results suggest that images do help construct ecological ideational meanings. Images and texts are complementary in conveying positive ecological values. Teachers are supposed to make good use of the combinations of images and texts to implant in their students the positive ecological values.

Conflicts of Interest: The authors declare no conflict of interest.
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] Halliday, M. A. K. (1985). *An Introduction to Functional Grammar (1st ed)*. Edward Arnold.
[2] Kress, G., & Van Leeuwen, T. (1996). *Reading images: The grammar of visual design*. Routledge.
[3] Ministry of Education. (2022). Yiwujiaoyu yingyu kecheng biaozhun (2022nian ban) [English curriculum standards for compulsory education (2022 edition)]. Beijing: People's Education Press.
[4] O'toole, M. (1994). *The language of displayed art*. Fairleigh Dickinson Univ Press.
[5] Ou, L. B., He, C, X., & Tian, X. B. (2022). Xiaoxue he chuzhong yingyu jiaocai zhong waiguo wenxue zuopinzhong de deyu yua nsu [Moral education elements in foreign literary works in primary and secondary school English textbooks]. *Masterpieces Re view (11)*, 57-59.
[6] Royce, T. D. (2013). Intersemiotic complementarity: A framework for multimodal discourse analysis. In *New directions in the analysis of multimodal discourse* (pp. 63-109). Routledge.
[7] Xu, M. (2023). jiyu jiwuxing xitong de chuzhong yingyu jiaocai shengtai huayu fenxi [An ecological discourse analysis of middle-school EFL textbooks on the basis of transitivity system]. (Master's Dissertation). Shanghai, China: Shanghai International Studies Universtity. https://link.cnki.net/doi/10.27316/d.cnki.gswyu.2023.000612
[8] Yin, R., & Gao, X. (2018). Youxiao jiaoxue shijiaoxia de chuzhong yingyu jiaocai wenben jiedu [Textual analysis of junior high school English textbooks from the perspective of effective teaching]. *Teaching & Administration (04)*, 61-63.
[9] Zheng, Z. L., & Ni, Y. F. (2022). Chuzhong yingyu jiaocai zhongguo wenhua zhuti neirong yanjiu [A study of Chinese cultural themes in junior high school English textbooks]. *Teaching & Administration (28)*, 53-57.
[10] Zhu, Y. S. (2007). Duomotai huayu fenxi de lilun jichu yu yanjiu fangfa [Theory and methodology of multimodal discourse analysis]. *Foreign Language Research (05)*, 82-86. https://link.oversea.cnki.net/doi/10.16263/j.cnki.23-1071/h.2007.05.034
[11] Zou, M., & Chen, Z. H. (2023). jiyu siwei pinzhi peiyang de chuzhong yingyu jiaocai shiyong yanjiu [The use of junior high school English textbooks based on the cultivaiton of thinking qualities]. *Journal of Tianjin Normal University(Elementary Education Editon) (03)*, 19-24. https://link.oversea.cnki.net/doi/10.16826/j.cnki.1009-7228.2023.03.004