

A Multimodal Ecological Discourse Analysis of Presentation PowerPoint Slides in Business English Class

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Abstract—This study applies the visual grammar theory to the multimodal ecological discourse analysis of the students' presentation PPT slides in business English class. It investigates the process of meaning construction through a quantitative analysis of 160 images and a thorough qualitative analysis of 2 specific images. The results reveal that students' ecological values embedded in PPT design are delivered via intersemiotic play of multimodal semiotic resources. And it is found that students' ecological values are in accordance with the ecosophy of "Diversity and Harmony, Interaction and Co-existence", which highlights the harmonious coexistence between man, society and nature.

Index Terms—multimodal ecological discourse analysis, visual grammar, ecosophy, business English

I. INTRODUCTION

Currently, the uncontrolled exploitation and employment of natural resources for rapid economic growth have caused various ecological problems such as environmental pollution, depletion of natural resources, endangerment of species and so on. From an ecological point of view, the conflict between humans and nature is increasingly intensifying, which threatens not only the ecology of nature but also the survival of humans themselves. In fact, ecological issues have become a main focus for all concerned parties. As ecological problems are becoming increasingly serious, and the key to ecological problems lies in the harmonious relationship between humans and others, humans and nature, and humans and other species. Consequently, in order to further address ecological problems, ecological linguistics researchers have shifted to focus on ecological studies, in which ecological discourse analysis has become a mainstream research lately. Therefore, ecolinguistics is an emerging field of study that has appeared in recent decades. Ecological discourse analysis highlights the impact of language in the ecosystem and ecological issues, aiming to demonstrate how discourse constructs the relationship between humans and the ecosystem and revealing the ecological values behind the discourse through discourse (Miao & Lei, 2019).

With the rapid advancement of technology, the invention and widespread use of computers, multimedia, and other Internet technologies, a tendency toward multimodality in human social communication activities has emerged. We live in a multimodal society, and with the advancement and widespread employment of modern science and technology, particularly multimedia, and other Internet technologies, there is also a multimodal trend in human social communication activities. Furthermore, images, colors, sounds, and other nonverbal resources could be seen in advertisements, posters, and news reports. In light of this, a growing number of linguists are beginning to pay attention to the impact of language on ecological and environmental issues. There are two recognized research models in ecolinguistics: the Haugen model and the Halliday model. On the one hand, the Halliday model emphasizes the function and influence of language to environmental conservation and the degradation of environmental problems. On the other hand, the Haugen model is concerned with the impact of environmental conditions on language ontology, particularly the endangerment of language and language variants (He & Liu, 2020).

Although the trend of multimodality has emerged long ago, little has been done in such areas as to combine multimodality with ecological discourse analysis. The majority of current studies are concerning on posters, news stories, and so on. However, there are few studies on multimodal ecological discourse analysis of PPT slide designed by students. Since PPT slides employ multimodal resources to construct meaning, they exhibit obvious multimodal characters. Therefore, it would shed some light on the relevant study from a new perspective in ecological discourse study. Since this research is concerned with the interaction between language and the environment, it applies the Halliday model as a theoretical framework for its investigation.

II. LITERATURE REVIEW

As it is known to all that language plays a significant role in ecological protection and movement. Language exerts

influence on the environmental ecosystem by guiding people's awareness, attitudes, and behavior. In ecolinguistics, the two widely acknowledged research models are Haugen model and Halliday model. They both agreed on the relationship between language and society, while differ on the role of the agent in the process.

In view of the diversity of research subjects and the scope of research topics in ecolinguistics, scholars have begun to investigate ecolinguistics from many perspectives and with various research purposes, resulting in the emergence of several branches, such as positive discourse analysis, critical discourse analysis, and multimodal discourse analysis. Critical discourse analysis is a new branch of contemporary linguistic research. It was first proposed by British linguists Fowler et al. (1979) in their book *Language and Control*. It investigates the reflection of social inequalities in discourse through discourse analysis and seeks to gain insight into rights and ideologies through textual analysis, based on the theory of systemic functional linguistics. To address the drawbacks of critical discourse analysis, professor Martin (2006) proposed a positive discourse analysis. With the rise of positive and critical discourse analysis models, and the rapid expansion of the Internet and science and technology, discourse has been becoming multimodal, and naturally, some researchers have begun to investigate discourse analysis from a multimodal perspective.

Multimodal discourse analysis is a branch in ecological linguistics. It has been in full swing since the 1990s, and Barthes (1977) was the first researcher to examine the relationship between images and language in terms of expressive meaning. Halliday (1994) published the theory of systemic functional linguistics, which has had a significant impact on ecological discourse analysis. Kress and van Leeuwen (2006) explored the relationship between modality and media, focusing on the phenomenon of meaning expressed by multimodal phenomena, including the role of visual images and various media. They also proposed the theory of Visual Grammar, which extends from the functional ideas of systemic functional linguistics to visual patterns and creates a grammatical framework for analyzing visual images. The grammatical framework includes three aspects, that is, representational meaning, interactive meaning, and compositional meaning. Lemke (1998) investigates the link between images and texts in scientific writings. O' Halloran (2019) not only studied the theoretical construct of multimodality, but also investigated the phenomenon of multimodality in mathematical discourse. Royce (1998) investigated the relationship between images and texts in advertising. Norris (2004) created her own multimodal analysis framework based on Scollon's (1999) MDT theory and applies it to examine building process of identity of two German women. Baldry and Thibault (2006) provided specific introduction to multimodal discourse transcription and analysis, including linguistic description, mapping, and how multimodal discourse analysis can be employed to aid teaching and learning in an electronic-learning environment.

With the increasing attention to the study of multimodal discourse in ecological perspective, China has also witnessed growing interest in multimodal research in recent years. Li (2003) introduces visual grammar theory and applies it to the analysis of multimodal discourse in Chinese contexts. Hu (2007) studied multimodal construction of meaning from both theoretical and practical perspectives. Gu (2007) proposed a framework of multimodal discourse analysis from the perspectives of media and communication to analyze the celebration rituals of the 50th anniversary of Beijing. What's more, quite a few researchers have put multimodal discourse analysis theory into educational practices. For instances, Zhang (2009) suggests a comprehensive theoretical framework for foreign language teaching and Wei (2009) studied multimodal discourse from the perspective of image, mood, composition, color, and print layout. Besides, many scholars start to conduct multimodal discourse analysis on film posters. For example, Cheng (2008) investigated multimodal discourse analysis of film posters. Li (2007) investigated the multimodal meaning of static and moving pictures through an interactive multi-perspective examination of film thematic categories, characters, views, titles, and posters. In ecological aspect, several researchers have begun to combine multimodal discourse analysis with ecological discourses lately, covering government environment report and corporate social responsibility report.

However, there is still much room for them to develop theories suitable to Chinese contexts. It is discovered that few research has been conducted on the ecological practices in higher education institutes in the perspective of multimodal discourse analysis. Therefore, this study finds it highly necessary and significant to fill in the gap by exploring the ecological values embedded in the use of multimodal semiotic resources in PPT slides designed by business-English-major students. This study aims to touch the following two research questions:

- (1) What are the ecological values conveyed through students' Power Point slides?
- (2) What are the ways in which multimodal semiotic resources function in the process of meaning-making?

By analyzing the PowerPoint slides designed by sophomore business English majors in the one-year ecological education program, it explores the ways in which students make use of multimodal semiotic resources to convey their ecological values and ecosophy from the perspective of multimodal ecological discourse analysis.

III. METHODOLOGY

A. Subjects

Guided by the ecosophy of "Diversity and Harmony, Interaction and Co-existence", this research applies the visual grammar theory to the multimodal ecological discourse analysis of the PPT slides designed by business English students of class 2005 and 2006. It investigates the process of meaning construction of 160 selected images through a quantitative analysis of their representational meaning and a detailed qualitative analysis of 2 specific images.

B. Instrument

Multimodal discourse analysis is based on Halliday's systemic functional theory of language, which identifies three fundamental meta-functions of language: ideational, interpersonal, and textual functions (Halliday, 1994). The ideational function is defined as the function of expressing the speaker's personal experience and inner activity; the interpersonal function is defined as the function of expressing the speaker's identity, status, attitude, motivation, and his inferences, judgments, and evaluations of things; and the textual function is defined as the function of forming sentences, organizing, and conveying information. The textual function relates to the role of language in the construction of sentences, the organization of information, and the transmission of information (Hu et al., 2005). In the 1990s, multimodal discourse analysis theory emerged in the West. Additionally, Kress & van Leeuwen, two prominent representatives of this theory, maintained that images and language have certain commonalities, that is to say, they are both symbolic systems expressing social meanings. Derived from the systemic functional theory, they developed Visual Grammar theory to analyze the process of meaning making in images in three aspects: representational meaning, interactive meaning, and compositional meaning (Kress & van Leeuwen, 2006).

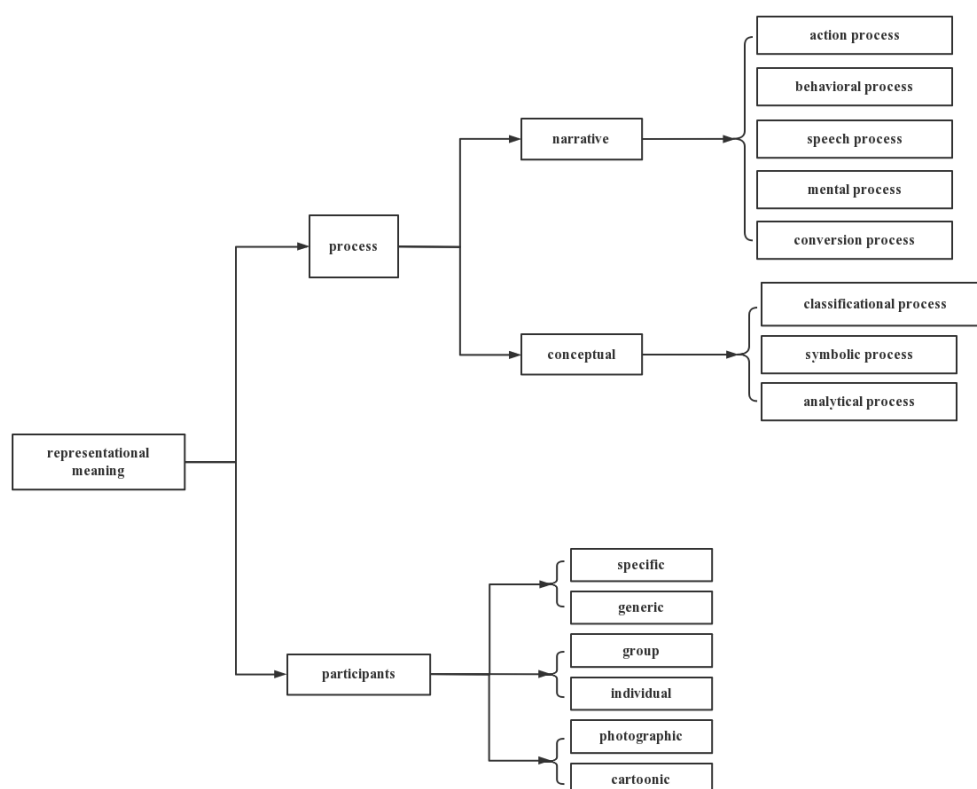


Figure 1. Analytical Framework

Based on Guo and Feng's (2015) framework, the study adopted a modified framework (Figure 1) to further categorize narrative and conceptual processes.

Firstly, the representational meaning corresponds to the ideational function in systemic functional grammar (Halliday, 1994). The representational meaning refers to the ability of any symbolic modality to reproduce an objective thing and its relationship to the outside world. The representational meaning can be divided into two categories: narrative representation and conceptual representation. Narrative representation reflects the relationship between participants through their interactions, which include action process, reactional process, speech process, mental process and conversion process. Conceptual representation, on the other hand, shows the relationships between participants through attributes, categories, and characteristics. Furthermore, it can be classified as classificational process, analytical process, or symbolic process. In a narrative image, elements in the image producing diagonal lines are thus defined as vectors (Li, 2003).

Secondly, in addition to recreating the interactions between people and objects, images can also establish a special relationship between the viewer and the image, thus the interactive meaning. It relates to the interpersonal function of the three meta-functions in systemic functional theory. Interactive meaning refers to the relationship between the picture maker, the viewer and the numerous modalities in the image that interact with each other. It could be divided into four dimensions: contact, social distance, perspective, and modality.

Thirdly, social distance refers to the closeness and distance of the image framing shot and typically symbolizes the

social proximity between the image and the audience. Kress and van Leeuwen (2006) mainly distinguish three types of social distance: close-up, medium shot and long shot. And Li (2003) divides distances into six categories: intimate distance (shows only the face and head); personal close distance (which shows the head and shoulders); personal distance (which shows the part above the waist); social close distance (which shows the whole person); social distance (which shows the whole person and the surrounding space); and public distance (which shows the whole body of more than four people).

Fourthly, the term perspective is commonly employed in images to express the viewer's attitude toward the image's participants. Kress and van Leeuwen (2006) divide perspective into two categories: horizontal and vertical. Horizontal perspectives are divided into frontal and oblique perspectives. On the one hand, the former is warm to the observer. Instead, the latter is cold to the observer, implying that the viewer is distant from the image and warned that the viewer does not belong in the image world. The vertical viewpoint emphasizes the equality of rights and status between the image's participant and viewer (Kress and van Leeuwen, 2006). Modality, which is widely employed in images, refers to the degree of honesty of the statements people make about the world they are interested in. What's more, like functional linguistics, modality has been classified into three levels: high, medium, and low.

Finally, compositional meaning represents the entire form of multimodal discourse, which correlates to Halliday's meta-function's textual function. Compositional meaning indicates that the viewer of the image focuses on the space structure of the dynamic model, it establishes the overall tone and aids the evaluation of the global compositional mind (Kress & van Leeuwen, 2006). Compositional representation can be divided into three basic components: information value, salience, and framing.

This study investigates selected images from PPT slides through a multimodal discourse analysis. It analyzes multiple modes salient in the images for the embedded meanings in the ecological context.

C. Procedure

As discourse analysis can be conducted in quantitative or qualitative analysis (Huang, 2018), this study conducts mixed methods to investigate the ecological values embedded in the discourse in a more comprehensive and profound way. In other words, this study applies the Visual Grammar framework to conduct quantitative and qualitative analysis of the selected images. First, by statistically classifying the representational meanings of the images, it reveals the implicit ecological values salient in the visual images. Then, by a complete visual analysis of the two selected representative images, it discloses the interplay of multimodal affordances of the images and interprets the embedded ecological values.

Given that this research involves the classificational of ecosystems, the ecosystem network proposed by He & Liu (2020) was simplified to an ecosystem network suitable for this study. It divides the primary ecosystem into four categories: terrestrial ecosystems, water ecosystems, physical ecosystems, and conceptual ecosystems. Images on deforestation, soil erosion, and dust storms are classified as terrestrial ecosystems; images of marine ecosystems, up-welling ecosystems, and lake ecosystems are classified as water ecosystems. Furthermore, images of industrial ecosystems, inhabitant ecosystems, and transport ecosystems, (such as images of white pollution, business trips, industrial pollution, paperless workplaces, etc.) belong to physical ecosystems. Finally, ethical ecosystem images belong to the conceptual ecosystems. What's more, conceptual ecosystem also covers images of the environmental impact of corporation expanding site.

By categorizing the images, 160 images were ultimately selected as the research sample. In the process of defining representational meanings, two types of processes are mentioned: narrative process and conceptual process. Moreover, narrative process could further be divided into four types: action process, reactional process, speech process, and mental process, whereas conceptual process consists of three types: classificational process, analytical process, and symbolic process.

IV. RESULTS AND DISCUSSION

A number of images of various ecosystem kinds and their percentages across the four primary ecosystems can be employed to highlight the ecological issues presented throughout the Power Point slide. Simultaneously, from quantitative perspective, representational meaning of the visual images contributes to and reinforces the ecological issues presented by the four major ecosystems in the PPT slides.

A. Quantitative Analysis

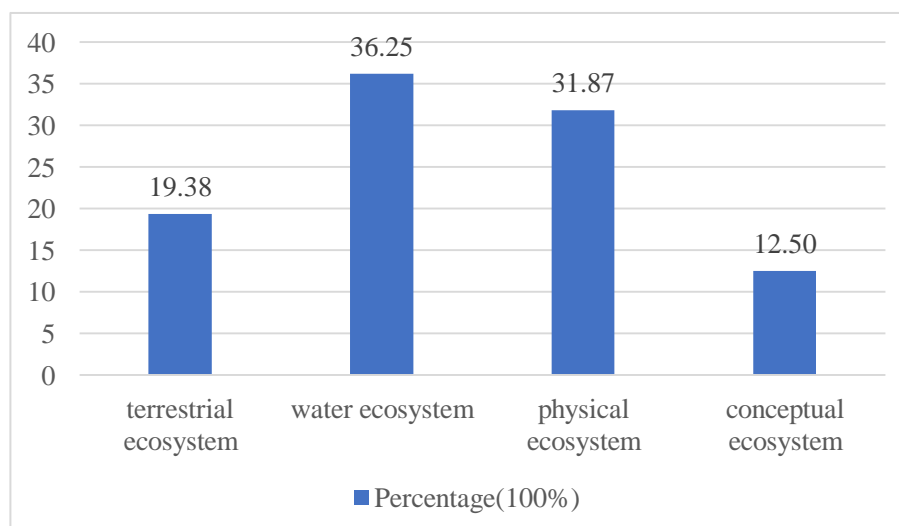


Figure 2. Image Distribution Across Four Types Of Ecosystems

The number of images belonging to four types of major ecosystems is calculated respectively, and the percentage for each type of ecosystem is distributed as shown in Figure 2.

The images of terrestrial ecosystems, ranging from land desertification to deforestation, account for only 19.38%. Water ecosystems account for 36.25 % of all ecosystems, approximately doubling the total number of terrestrial ecosystems. It is also the largest and most important component among the all ecosystems, including images of marine pollution, lake pollution, acid rain, and the ozone layer hole. The physical ecosystem is the second largest of the four ecosystems with 51 images, accounting for 31.87%, just below the water ecosystem and very close to the amount of images of water ecosystem. It covers images of white pollution, industrial pollution, and ecological business travels. The conceptual ecosystem has the smallest percentage within the four ecosystems (12.5%), and it incorporates images of corporate expansion and eco-marketing.

The study found that the sample focus more on images of water ecosystems, highlighting the severity of pollution in the ocean, and calling on humans to care for the ocean, protect marine life and reduce emissions of air pollution gases. In addition, it found that there are only 58 images of water ecosystems, while images of upwelling ecosystems are 34, such as images of acid rain and the ozone layer hole, nearly half of the total number of water ecosystems. In addition, as can be seen from the graph above, images of industrial ecosystems and transport ecosystems play an important role in the construction of the ecological theme of the PPT, such as images of business travel and industrial pollution. What's more, it can be evidenced by the second largest proportion of physical ecosystems in the graph above. The images of the four ecosystems consist of the most important part of the PPT. The water ecosystem represents largest proportion among four ecosystems, highlighting the seriousness of the pollution of water ecosystems in real life, where water is the life resource and water ecosystems are closely related to human life.

In Visual Grammar, images are categorized according to their representational meanings. Table 1 illustrates the findings of the examination of the representational meanings of all images and the categorization of those images according to narrative processes, conceptual processes, and participants.

TABLE 1
PROCESS AND PARTICIPANT TYPES ACROSS ECOSYSTEMS

representational processes	process types	terrestrial ecosystem (N=31) (%)	water ecosystem (N=58) (%)	physical ecosystem (N=51) (%)	conceptual ecosystem (N=20) (%)
narrative process	action process	29.03	12.07	43.14	60.00
	reactional process	3.23	0.00	0.00	0.00
	speech process	3.23	0.00	0.00	5.00
conceptual process	classificational process	0.00	1.72	1.96	5.00
	analytical process	61.29	58.62	49.02	30.00
	symbolic process	3.23	5.17	5.88	0.00
	generic	22.58	6.90	25.49	20.00
	specific	0.00	0.00	0.00	5.00
participants	individual	9.68	1.72	17.65	20.00
	group	9.68	5.17	11.76	5.00
	cartoonic	25.81	39.66	11.76	50.00
	photographic	19.35	6.90	29.41	25

Firstly, terrestrial ecosystems take up a limited number of pictures, of which conceptual processes occupy more than

half (64.52%) and narrative processes for slightly more than half of conceptual processes (35.49%). Within the conceptual process, images of analytical process take up the largest proportion of 61.29%, followed by those of the symbolic process (3.23%).

Compared to other types of ecosystems, the proportion of images of action processes is smaller in terrestrial ecosystems (29.03%). On the one hand, this is undoubted for the simple reason that this type of image is more descriptive or informative to demonstrate terrestrial ecosystems. On the other hand, unlike water and physical ecosystems, water is essential for human survival and cars are a means of transport, they are closely linked to human life and therefore there is more destruction due to human activity. Meanwhile, environmental degradation in a way affects human living and activities, hence there tend to be more images about water and physical ecosystems than of terrestrial ecosystems.

Analytical processes account for 61.29% of all images, including land desertification and soil erosion. Among these, the analytical process, which mostly presents images without participants, aims to give the viewer a powerful visual impact and to stimulate awareness of the rational use and conservation of the land. In summary, it seeks to remind humanity to strengthen ecological civilization in the midst of rapid modern economic progress, highlighting the idea of the General Secretary's thought that lucid water and lush mountains are invaluable assets.

Pictures of the symbolic process are the second most under the category of the conceptual process (3.23%). It consists primarily of the image of the Earth sweating, which people will associate with the hole in the ozone layer caused by excessive greenhouse gas emissions and the eventual rise in Earth's temperature. This image has a clear symbolic meaning, so it is classified as a symbolic process within the category of conceptual processes.

Secondly, water ecosystems comprise of a larger portion (58.62%) of the analytical process, including images of harmful gases such as sulphur dioxide emissions from chimneys and air pollution from car emissions, acid rain corroding sculptures and trees, lake pollution by industrial effluents, and marine pollution. Moreover, the majority of these images are presented without participants. However, cartoon characters occupy a larger proportion (39.66%) of the images with participants, while only 6.9 percent of the participants are photographic figures. Due to destructive impact on water ecosystems and lack of environmental awareness, this type of image is devoted to the image of cartoon characters to arouse the public awareness.

Thirdly, physical ecosystems account for a significant percentage of the action process (43.14%), it covers images of paperless offices and green travel with participants. It attempts to describe individuals as ecological agents who contribute to the environmental development. The analytical process takes up a large share (49.02%) compared with the action process, including images of white pollution, paperless workplace and green travel. It shows that humans pay attention to develop a green ecological environment. The majority participants in the images are real-life people (29.41%), reflecting the high level of participation in greening protection and highlighting human's efforts to achieve green changes through low-carbon travel and paperless offices, demonstrating their sense of social responsibility and ecological conservation.

Finally, under the narrative representational processes, pictures of action process of the conceptual ecosystem occupy more than half (60%), among which the number of eco-marketing images is very large, such as those images of eco-farms and protecting the planet. These images show human's efforts in order to build a green earth. Of the participants, 50% participants appeared as cartoon characters, while 25 % were people in real life, reflecting the fact that the idea of eco-marketing has not yet penetrated people's minds in a wide sense. In addition, only 5% of the participants were in groups, while more participants appeared as individuals (20%). It reveals that people are not yet aware of the enormous energy generated by promoting eco-marketing in a collective way, but instead emphasizing on the power of the individual.

B. Qualitative Analysis

Two images are analyzed in details from the perspective of visual discourse analysis. Figures 3 and 4 are from images of green travel and urban ecological civilization in conceptual habitats. They represent major ecosystems: conceptual ecosystems, terrestrial conceptual systems, and water ecosystems. Hence, the selected images represent key features of the entire data.



Figure 3. Business Travel Image

Figure 3 is a narrative representation of the conceptual ecosystem. The image has a blue-greenish background, and the hand on the right is holding a modern city, with green trees, tall buildings, green sports car, and sunflowers blossoming towards the sun, all depicting a relationship of harmony and co-existence between human and nature.

In terms of interactive meaning, the absence of eye contact could be interpreted in the way that the designer intends to provide the viewer a more comprehensive and objective perspective into the ecological relationship between man and nature. Hence, it is concerned with transmitting information to the viewer, thus it is an offer image (Kress & van Leeuwen, 2006). These single elements compose a modern landscape in which man and nature coexist in harmony. The palm of the hand, the hot air balloon, and the rising skyscrapers are in the foreground, while the blue sky, white clouds, and green grass are in the background. Furthermore, the former belongs to the social ecosystem and the latter belongs to the natural ecosystem. It indicates that natural ecosystem is the foundation of the social ecosystem and the social ecosystem is the development of the natural ecosystem. Despite their distinctions, the two ecosystems are closely related and complementary to each other (He & Liu, 2020). The image as a whole conveys the notion that in a modern city, man and nature coexist in peace, and that man should respect and protect nature.



Figure 4. Eco-Marketing Image

The image is chosen from a conceptual ecosystem and analyzed in terms of representational meaning, with the visual features in the image reflecting the process of behavior in narrative representation. The image depicts people in a circle, with the giant Earth in the center, numerous individuals playing with a roller on top of the large Earth, and a small Earth above the large Earth, held by four people with their hands.

The human beings protecting the Earth in the image are shown in cartoonish characters, implying that the participants have equal rights regardless of their races and nationalities. All act together to protect the Earth. It reinforces the idea that ecological protection has no borders and all human being share a common life. It also depicts a future of harmonious coexistence between humans and nature, where every individual is under duty and responsibility as promoter and practitioner in ecological protection.

In the perspective of information value and salience, the slogan "Protect our Earth" is designed in an obvious way to attract the viewer. In other words, this high degree of salience can quickly draw the viewer's attention to the theme of the image. A green heart is place as the background in the image, and the actions and behaviors are place as the foreground, highlighting the harmonious co-existence between man and man, man and nature, and man and society (He &

Wei, 2018).

C. Findings and Discussion

Stibbe (2015) grouped ecological discourses into three categories: beneficial discourses, ambivalent discourses, and destructive discourses. By analyzing the representational meanings of the images, it is discovered that these images show multiple processes in the representational meanings.

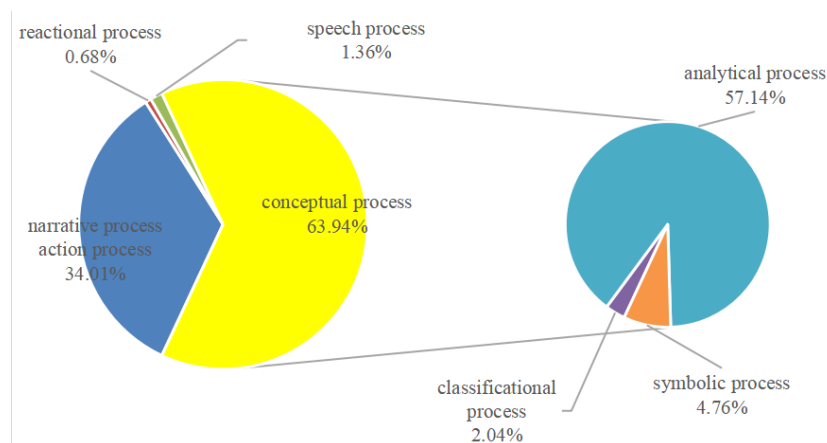


Figure 5. Process Types of Images

As shown in the figure, all images are classified into two categories of processes: narrative processes and conceptual processes. Images of conceptual processes take up for the majority (63.94%), while images of narrative processes account for a substantially lower proportion (36.05%). There are some images representing conceptual process, such as white pollution, marine pollution, air pollution, land desertification, corporate expansion, and eco-marketing. These images are used to depict ecological problems in the conceptual process. However, narrative processes depict people as doing and happening (Kress & van Leeuwen, 2006). This kind of process depicts the acts of the participants in order to influence the observer and raise awareness of the importance of environmental conservation. This is due to the fact that beneficial discourse influences and guides people consciously and unconsciously. Another essential point is made through action process of tree-planting that positive ecological values towards are recommended in narrative representation.

In the narrative process, images of action processes account for a larger proportion (34.01%), including images of deforestation, plantation and conservation of resources, while images of verbal processes account for only 1.36 % and reaction processes take up for an even smaller proportion (0.68%). It reflects the fact that images convey information less through words and eye contact and more through action processes, primarily because actual actions are far more powerful and resonant than words and eye contact.

Furthermore, images of conceptual processes primarily include those non-participant types, such as white pollution, land desertification, corporate social responsibility, sand city storms, paperless offices, and business travel. Images of analytical process dominate proportionally (57.14%) over those of classificational process (2.04%) and even those of symbolic process (4.76%). This is due to the fact that the ecological problems depicted in the analytical process images, such as white pollution, ocean pollution, and dust storms, are extremely serious and are caused by the human's uncontrolled consumption of natural resources in daily lives, and thus the majority of the images use analytical process images. Therefore, it constitutes destructive discourse from an ecological viewpoint.

And in conceptual process, those images of the hole in the ozone layer are attributed to the classificational process. It reflects that people do not pay sufficient attention to air protection and their lack of green awareness leads to car exhaust and industrial waste gases directly into the air, eventually causing the hole in ozone layer. From an ecological standpoint, this is an ecologically destructive discourse. Images classified as symbolic process carry such ecological values as saving and protecting water with their hands. It calls on people to cherish natural resources, and engage in ecological conservation practices. Inevitably, these images belong to ecologically beneficial discourses.

The two images discussed above have been analyzed in the theory of visual grammar, with each meaning covering distinct modality. The representational meaning highlights the meaning of the whole image through the action process of narrative process, the interactive meaning conveys the meaning of the image in terms of contact, social distance and perspective, while the compositional meaning presents the meaning of the image in terms of both information value and salience. Each image covers different aspects of the three major meanings and is a comprehensive representation of the process of generating the three major meaning processes. They interplay with one another and complement each other to make meanings visually.

Figure 3 depicts a modern society of harmonious co-existence between people, society and nature through the use of representational, interactive, and compositional meaning processes. It aims to construct an ecological civilization where human beings are responsible ecological agents. Figure 4 shows representational and compositional meaning through

the actions of the participants and the operation of the visual elements. It confirms that fact that collective power of a large group is enormous, calling on all mankind to join hands to build a community of life on Earth and a green Earth. They tell visual stories so as to rebuild a better environment after the destruction of the natural ecosystem, and meanwhile profoundly highlight that mankind is an indispensable and key participant in the process of constructing an ecological civilization. Ecological problems can only be resolved when all human races around the world act together.

V. CONCLUSION

Visual Grammar is utilized as a theoretical framework in this research to quantitatively analyze the three primary meaning processes in the context of ecological education. The quantity of images and the proportional distribution of process types of these images in the quantitative analysis assist to reveal ecological issues and convey ecological values of environmental protection. The qualitative analysis of two images demonstrates the ecosophy of “Diversity and Harmony, and Interaction and Co-existence” among human, nature, and society. Besides, they emphasize the significant role of human beings in the restructuring of nature and the importance of building an ecological civilization in modern cities.

To begin with, analysis of the images about ecology reveals that students primarily occupies action processes, analytical processes, and cartoon characters to convey positive ecological values about protecting oceans and forests, cherishing fresh water resources, traveling green, and working to solve global ecological problems. What’s more, the research found that fewer students employ speech processes, reactional processes, and symbolic processes. A large number of analytical processes in the images demonstrate the severity of environmental pollution, such as soil erosion, deforestation, white pollution, and air pollution. It is aiming to call for people to work together to protect the environment and contribute to the development of an ecological civilization. Furthermore, many of the actions shown in the images demonstrate that individuals and the Earth are a global community of life. People from all over the world should work together to build a community with shared future for all life on Earth regardless of race or national boundaries. In fact, it can be seen that participants within images include cartoon participants, showcasing that it is a general and broad sense for human to participate in the movement of environmental protection before everyone grows to be “an ecological man”.

In addition, the analysis implies that there exists a smaller proportion of speech processes, classificational processes, and symbolic process. The speech process is less effective than the action process, and physical action is more convincing than verbal persuasion. The classificational and symbolic processes do not show a distinct symbolic or classificational character in most of the images, as a consequence, there are fewer images of the classificational and symbolic processes.

However, this study still displays certain limitations, which could also be the research directions for future study. First, due to time and energy constraints, this study narrowed the sample size down to 160 images in total, while a larger sample size would produce a more comprehensive and substantial understanding of the mechanism of meaning-making processes. Second, the research covers merely the visual resources in static images, while neglecting the audio resources (music, sound) and animations in moving images (video). Hence, it is highly suggested that future research could expand relevant study by including dynamic modes such as video and audio as well as static modes such as images and text contained in the sample PPT slide for a multi-dimensional, more comprehensive, and insightful analysis. Moreover, interdisciplinary research would enrich multimodal study with innovative perspectives other than linguistics. And this study would serve as an example for cross-disciplinary studies in various contexts.

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