

Can Defining Graphic/Written Text Relations Support
Reading Comprehension in Multi-Modal Texts?

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図形と文字情報の相互関係の明確化により、
マルチ・モーダル・テキストにおける読解教育は支援可能か？

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要 旨

読解授業で使用される画像ベースのマルチ・モーダル・テキスト（単語と画像を統合したテキスト）の増加により、読解教育はますます大きな課題に直面している。実際、画像ベースのマルチ・モーダル・テキストは、従来の教育研究における見解以上に、理解に困難を伴う可能性がある。最近の研究では、画像ベースのマルチ・モーダル・テキストを構成する潜在的な図形・文字テキスト関係の明確化により、この種のテキストを使用して指導する教師の手助けとなり得ることを示唆している。

当論文は英語教授 (ELT) 授業における読解を補佐する図形・文字テキスト関係の明確化用の理論的モデルを提唱する。当該モデルを構築する為、選択体系機能文法 (SFG) 及び第二言語読解の2分野の研究を使用している。さらに、当該モデルが、実際のマルチ・モーダル・テキストにどのように応用出来るか実証し、応用したテキストが生徒の読解に与える効果を予測可能にしている。

Abstract

With the increasing use of image-based multi-modal text (text that combine words with images) in reading classrooms, teaching reading comprehension has become a growing challenge. Indeed, understanding image-based multi-modal text may be more difficult than described in existing educational research. Recent research suggests that defining the underlying graphic/written text relations that constitute image-based multi-modal texts can be useful in teaching such text. This paper proposes a theoretical model for defining graphic/written text relations that can support reading comprehension in English Language Teaching (EFL) classrooms. Two areas of research are used in creating this model: Systemic Functional Grammar (SFG) and second language reading comprehension research. The model is applied to an authentic multi-modal text to predict the effects of such a text on students' reading comprehension.

1. Introduction

In the middle ages, the Guttenberg bible (1450) ended the dominance of the oral tradition and heralded in the age publishing. This change, history teaches us, produced massive short term and long-term effects on literacy. In the modern age, digitalization, researchers and practitioners are arguing, is producing an equally significant change on literacy. One of the most significant changes that digitization is creating is the emergence of “multi-modal texts” as the main form of textual communication.

A multi-modal text is a text that utilizes more than one mode to communicate it’s message, for example, screen-based digital texts (computers, mobile phones, and iPods) combine images (the visual mode) and words (the written mode). These types of texts are changing literacy because readers do not read along the traditional linear structure of left to write on a page. Rather readers have to follow a visually hyperactive reading path that follows the rules of visual design as well as the rules of written language (Kress 2006, pp.35-36).

However, multi-modality is also changing traditional written/published texts. In the emerging digital age, the once specialized skills of the publishing industry are now widely available. Consequently, writers are incorporating a wide variety of visual features such as bullet points, excel tables and images in texts that, 50 years ago, would only have used the written mode (Kress 2006, pp.16-34). Furthermore, literacy is becoming increasingly popularized. For example, recommended texts in the modern curriculum may now include predominately multi-modal texts such as comic books, DVDS and even computer games (Coiro 2008, pp.1-21; Black 2008, pp.583-605).

Logically, if literacy is changing then education must also change. Lui (2004, pp.225-243) points out that popular texts that incorporate graphics and words, such as comic books, are far more complex than has a been accounted for in existing research. Bhatia, (2006, pp.279-297) suggests that the majority of teachers, educated in the age of publishing, with no training in graphics, are not equipped to teach modern digital texts that use multi-modal texts relations. Researchers are calling for a ‘multi-modal grammar’ (Kress and Van Leeuwen 2006, pp.16-24) or multi-modal communicative competence (Royce , 2002) to support the teaching of new literacies.

This paper will contribute to this area of research by suggesting the principles of SFG can be combined with EFL reading comprehension research to define multi-modal text relations. It will focus on graphic written/ text relations and show how they be used to help teachers predict the potential effects a multi-modal text will have on reading comprehension. For example, by applying the model to a text teachers will be able to predict how challenging or how easy the multi-modal text will be for a particular set of students.

Parts 2 will outline S.F.G. principles and create the theoretical model that will define graphic/ written text relations. Part 3 will show how the definitions of graphic/written text relations can be

related to reading comprehension research to assess student's potential comprehension. Part 4 will apply the model to an authentic text, "Macbeth: The Graphic Novel" (McDonald *et al.*, 2008), to analyze the texts underlying graphic/written text relations and predict their potential effects on reading comprehension. Part 5 will discuss the findings and Part 6 will suggest the pedagogical significance.

2. The Theoretical Model for Defining Graphic/Written Text Relations in Support of Reading Comprehension

2.1. The Principles of an SFG Approach to Visual Design

The theoretical foundation for defining graphic text relations is Halliday's "trinocular" (Halliday and Matthiessen 2004, pp.31) perspective on language, which analyzes written/spoken texts using three meta-functions: textual, experiential, and interpersonal. Kress and Van Leeuwen (2006) applied this model to image-based texts to produce the three related meta-functions as follows:

- the compositional function (related to the textual function)
- the representational function (related to the experiential function)
- the interactive function (related to the interpersonal function)

The following sections will explain each function.

2.2.1 The Compositional Function:

The "compositional meta-function" is related to the textual meta-function in written analysis (Jewitt and Oyama, 2001, pp.147-151). Consequently, just as the placement of clauses in a written text determines the importance of the information placed within the clause (Halliday and Matthiessen, 2004: p.64; Fries, 1994, p.230), so too does the placement of elements in a picture determine the visual importance of the elements.

Kress and Van Leeuwen (2006, p.177) identified the three elements of framing, salience, and information value (explained below), which can be combined in different ways to create different "meaning potentials" in visuals. Meaning potential means the intended effect words and images have on the receiver of the information. How the information is actually received will depend on the receiver's ability to interpret it (Halliday and Matthiessen, 2004, p.26; Kress and Van Leeuwen, 1999, p.379).

2.2.2 Framing

Framing refers to how elements are connected or disconnected through framelines. For example, in Figure 1 below, the king and his attendants, who are receiving news from the battlefield, are joined shoulder to shoulder in one frameline, while the wounded soldier, who is the deliverer of

the news, is disconnected from the receivers by the yellow framing of the tent. The written text is separated from the visual text by framelines. Thus, the parchment scroll text box, which orientates readers to their place in the play, is disconnected from the simple text box, which orientates readers to the setting of the scene. It is significant, for this study, that the image is composed in a way that allows the written text to repeat the information in visual text. This will be explained in more detail in part 3.

Figure 1 - Framing



2.2.3 Information Value

The decision to place elements on top or at the bottom of an image gives them a certain value (Jewitt and Oyama, 2001, p.196). In Figure 2 (below), the placement of information on top of the picture carries the “ideal” information, which is the more general content of the message. The placement of information beneath the image carries the “real” information, more specifically, the practical information (Kress and Van Leeuwen, 2006, pp.186-193). This meaning potential can be observed historically. In Christian art, for example, religious paintings depict the “divine” of the sky contrasted with the ground of man. It can also be observed in day-to-day life. An example is in car advertisements where the “ideal” image of the car is placed on top while the “real” factual information, which supplies details about the car, is placed at the bottom (Kress and Van Leeuwen, 2006, pp.186-193).

In Figure 2 below, the image follows the same pattern as the car advertisement described above, describing a graphic text-based image. Here, the main idea the image is trying to convey (the “ideal information”) is carried in the upper placed graphic text (the picture of witches engaged in the powerful act of casting a spell), while the lower placed written text carries the details (the actual words of the spell which are incomprehensible unless you understand witchcraft). From an L2 perspective this image is not composed in a way that the graphic text repeats the main idea of the visual text. Rather the modes augment each other. This will be explained in more detail in part 3.

Figure 2 - Information Value



2.2.4 Salience

Salience refers to the prominence given to one image element over another. Obviously, this is done through size, color, contrast, and others, but it can also be achieved by choosing to place images at the center or along the margins of the picture. Returning to Figure 1, the information central to the overall story—the speech bubbles and pictures of the king receiving news—is placed in the center, while the peripheral information—the orientating information and background pictures of the camp—are placed along the margins. In Figure 3, the written text is made salient by the reduction of the image elements to just the speech bubble and the head of the speaker. Comparing the two images from an L2 perspective, unlike Figure 1, in Figure 3 the image is not composed with a reiterating relationship between visual and words. This will be explained in more detail in part 3.

Figure 3 - Salience



2.3. The Representational Content

The representational content of a picture, which is closely related to the experiential function of the written text, defines how participants, processes, and circumstances are portrayed (that is, represented) in a picture (Kress and Van Leeuwen, 2006, p.114; Jewitt and Oyama, 2004, pp.141-142). This can be done visually in two ways, as “narrative images” or as “concept images.”

2.3.1 Narrative Images

Narrative images, of which Figures 1 and 2 are examples, are images that are composed to create a sense of action or a sense of an event taking place in the imagined world. This is achieved by creating a “vector,” a line that connects two or more participants in an image (Kress and Van Leeuwen, 2006, p.59). In Figure 1, the vector is created by direction. All the participants (the king, his son, the attendant, and the eavesdropping soldier) are gazing at or pointing to the direction of the wounded soldier. Likewise, the soldier is returning the gaze by looking in the direction of the king. This tells the reader that the main event in the picture is the wounded soldier reporting the news to king. In Figure 2, the vector is the fire. The witches' attention is focused on the fire, and the fire is connected to the witches by framing and color. This communicates to the reader that the main action of the image is centered on the witches and the fire.

2.3.2 Concept Images

In concept images, the participants are not represented in action; no vector joins them. Rather, the participants are represented in a fixed state of being, such as a portrait painting (Kress and Van Leeuwen, 2006, p.79). Figure 3 is a concept picture. Here, the witch is represented in a close-up, as in a portrait, staring in the direction of the viewer.

2.3.3 Classifying Narrative and Concept Images

It is possible to classify images, through an understanding of the representational function, into two contrasting types: narrative images or concept images. This can be done quite simply by asking a series of representational questions once the basic principles are understood, as shown below.

- 1) Is the image representing a narrative? (Is it portraying an event? Does it have a vector?)
- 2) Is the image representing a concept? (Are the participants not joined in action together? Are they staring at the viewer or into the distance? Is the image portraying an idea rather than event?)

Similarly, analyzing images for their underlying interactive content also allows the images to be classified into two contrasting types, as will be shown in the next section.

2.4. The Interactive Content

The interactive content of a picture is very similar to the interpersonal function. Therefore, just as content of language can be categorized into two basic positions, either offering or demanding information/goods and services (Halliday 2004, p.107), so too can the content of images be categorized into two types of images: offer image or demand image.

2.4.1 Offer Images

Figures 1 and 2 (above) are pictures offering information to the viewer. The reader of the image is placed, through long shots, at a detached distance from the image and is expected to observe and analyze various elements framed in the picture: the participants, what the participants are saying, and the circumstances.

2.4.2 Demand Images

Figure 3, in contrast to Figures 1 and 2, demands attention from the viewer. The receiver is placed at a close-up, almost face to face with the sender of the information. Thus, the illustrators have increased the value of the elements placed in the picture. The reader is expected to focus on the words in the text, which carry the general meaning of text because they have been given salience and placed on top. Additionally, the reader is expected to focus on the face of the witch, and with eye to eye contact between the reader and the witch, the reader is expected to be emotionally involved with the sender of the information (Eisner, 2004, p.89).

Understanding the emotional content of demand images is important in creating a definition of graphic/written text relations because, as Kress and Van Leeuwen (2006, pp.1-15) point out, if multi-modal texts are to be effectively analyzed, the definition must not prioritize the linguistic system over the visual. The definition needs to reflect both modes. Thus, when reading a text, it is important for the reader to consider not just the words in the written text but why the writer has chosen, for example, a demand image rather than an offer image at a particular point in the text.

Furthermore, demand/concept pictures have a restricted use in visual storytelling. Overusing them can reduce their emotional value, and they do not display actions efficiently in what is essentially a visual medium (Eisner, 2004, p.89). When they are used, the writers sacrifice textual efficiency for emotional content. Thus, understanding these multi-modal text decisions is important if a full understanding of graphic/written text relations is to be achieved.

2.4.3 Classifying Offer and Demand Images

Again, it is possible to classify images, through an understanding of the interactive function, into two types: offer and demand. This can be done quite simply by asking a series of interactive questions once the basic principles are understood, as shown below.

- 1) Is the image interacting with the viewer by offering information to the viewer?
- 2) Is the picture interacting with the viewer by demanding attention from the viewer?

2.5. Classifying Images Into Types: Narrative Offer Images and Concept Demand Images

Kress and Van Leeuwen's model for visual analysis can be used to classify images into two contrasting types: narrative offer pictures and concept demand pictures. Figures 1 and 2 are narrative offer pictures, wherein the illustrators offer narrative information to the viewers. On the other hand, Figure 3 is a demand concept picture. The illustrators present an idea, not an action, and they demand an emotional response from the viewer.

Part 4, next, will show how this classification of images into two contrasting types can be applied to the definitions of graphic/written relations, as outlined by Unsworth (2008), (introduced p.4, and part 2.3.3). Furthermore, it will relate these semiotic definitions of graphic/written text relations to the relationships of support, redundancy, incomprehension, and miscomprehension.

3. A Definition of Graphic/Written Text Relations that Can Be Used to Support Reading Comprehension

3.1. Introduction

Aligning the definitions of graphic/written text relations in systemics with EFL reading comprehension research can, this paper asserts, create a model of graphic/written text relations that can be used to predict the potential effects a text will have on reading comprehension. This section will explain the model. Part 3.2 will examine graphic/written text relations in the narrative offer panels; Part 3.3 will examine graphic/written text relations in the demand concept panels; and Part 3.4 will summarize the theoretical model.

3.2. Concurrence in Narrative/Offer Panels

Concurrence occurs when the visual and the written text send equivalent information (Unsworth, 2008, p.387). This relationship is shown in Figure 4 below. The information in the graphic text concurs with, that is, repeats the information in the written text. The written information framed in the text box "In his camp at Forres, King Duncan receives news of his army's battle ..." is repeated in the visual frames. The receivers of the news, the king and his attendants, are framed in one frameline, receiving news. The wounded soldier is framed in a separate frameline, delivering the news. Similarly, the graphic frame supports the information framed in the speech bubbles of the central dialogue. When the king asks "Who is this man covered in blood?" he is referring to the wounded soldier framed at a distance from himself.

Figure 4 - Concurrent Offer Panel



This type of panel, with a reiteration of the key linguistic items in the visual, is expected to support reading comprehension for readers whose proficiency level is below the level of the texts (Lui, 2004, p.237). The graphic text and the written text compensate each other in making the overall message comprehensible to the reader. However, while this panel has the potential to support reading comprehension, the images may also be redundant for L2 learners. This will occur when the learner's proficiency level is above the level of the text. For this paper, this type of panel will be called Concurrent Offer Panels (CCOP).

3.3. Complementation in Narrative/Offer Panels

Complementation occurs when the graphic text and written text send messages that, although clearly connected, do not reiterate each other (Unsworth, 2008). As mentioned above, in Figure 5 below, the reader is expected to process complex information that is spread across both the graphic and the written texts. Thus, the graphic text framed at the top communicates the main action of the witches casting a spell. The written text framed beneath the image does not directly reiterate the graphic text; it augments it by adding additional details such as the words of the spell itself. These words, ("I come Graymalkin," "Paddock calls," and others) may be difficult to relate to the visual text unless the reader has both a linguistic and perhaps cultural knowledge of witchcraft.

Figure 5 - Complementary Offer Panel



Again, this graphic/written text relation can be related to reading comprehension research. In these panels, the graphic mode and the written mode do not closely reiterate the same message. Therefore, they are not expected to support reading comprehension (Lui, 2004, p.238). Incomprehension or miscomprehension may occur with these types of panels.

Incomprehension occurs in students' whose proficiency is lower than the words in the text. Here the students cannot use the graphic text to guess the meaning of the words. Therefore they cannot understand the written text. Miscomprehension, on the other hand, occurs when students make an incorrect assumption about the graphic/written text relationship. They assume that the graphic text does support the information in the written text and create a different meaning for the words than was intended by the author. For this paper, these panels will be called Complementary Offer Panels (COP).

3.4. Complementation in Demand/Concept Pictures

The graphic/written text relation of complementation also occurs in demand/concept pictures. In Figure 6, below, the written text carries information that is not directly integrated with the graphic information. Thus, as explained above, the writers/illustrators have chosen to make the words salient. Moreover, they have chosen not to illustrate the underlying function of the words in the image. Rather, they focused the reader's attention on the face of the speaker. From a textual viewpoint, as above, this increases the significance of the written text and the emotional content of the graphic text. However, from an L2 perspective, the image cannot help the readers create a mental picture of the written text because the image is communicating a different message from the written text.

Figure 6 - Complementary Demand Panel



A generalization can be made on these types of panels in texts. If illustrators use these demand/concept panels, they expect the readers to focus on the written text and the image to send an emotional message. From a reading comprehension perspective, if this type of panel exists in a narrative text, L2 learners' role is expected to be extremely active in this panel. The readers must process all the words linguistically with no visual clues and then process the significance of the image separately. Relating this type of image to reading comprehension research (Lui, 2004, pp.238), with little integration between the graphic text and the visual text, the image is not expected to support reading comprehension. Rather, it is expected to create incomprehension or miscomprehension. In this study, these types of images will be called Complementary Demand Panels (CDP).

4. The Predicted Effects of Graphic/Text Relations on Reading Comprehension

4.1. Determining Panel Types in the Macbeth Text

The model, outlined above, was applied to excerpts from an authentic text (a text not produced for the TESOL classroom), “Macbeth: The Graphic Novel’s” (McDonald et al., 2008) Act 1 scenes 1 and 2. Using the system of question (summarized in Table 2) the 10 panels were classified into two types: Narrative Offer Panels and Concept Demand Panels (summarized in Table 1). As shown in the table, the majority of the panels are narrative offer panels, while concept demand panels constitute only 3 of the 10 panels.

The potential effects on reading comprehension are shown in Table 3. Only two panels, 1 and 7, show the graphic/written text relation of concurrence expected to support reading comprehension. The other images ask the reader to process complimentary written text messages and graphic text messages which are not closely integrated. Therefore, students are expected to find the text difficult to process.

Table 1. Image Types in the Macbeth Text

Image Type 1	Image Type 2
Narrative / Offer	Concept / Demand
Panels 1, 5, 6, 7, 8, 9, 10	Panels 2, 3, 4

Table 2. Determining Image Functions in Texts

The Representational Function	The Interactive Function
What is the image representing?	What is the image asking the reader to do ?
Is the image representing a narrative?	Is the image offering information to the viewer?
Is the image representing a concept?	Is the image demanding attention from the viewer?

Table 3. Graphic/Written Text Relations and their Effects on Reading Comprehension

Key-CCOP=Concurrent Offer Panel; CDP=Complementary Demand Panel;

COP=Complementary Offer Panel; R/C= Reading Comprehension

Panel Type	Panel Number	R/C Relationship
CCOP	1,7	Support/redundancy
COP	5, 6, 8, 9, 10	No support/hindrance
CDP	2, 3, 4	No support/hindrance

5. Conclusions

This paper suggests that the theoretical model for defining graphic/written text relations can support reading comprehension. For teachers, applying the model to multi-modal texts would only involve three steps. First, the compositional, representational, and interactive meta-functions can be applied to image-based multi-modal texts to classify two types: demand/concept images and narrative/offer images. Second, graphic/written text relations of concurrence or complementation can be applied to the image types to subdivide the images into three: Complementary Demand Images, Complementary Offer Images, and Concurrent Offer Images. Third, the reading comprehension research findings can be applied to the image classifications to predict their potential effects on reading comprehension. Thus, complementary demand images and complementary offer images are not expected to support reading comprehension because the graphic text and the written text are not closely integrated. Concurrent Offer Images are expected to support reading comprehension because they are closely integrated.

Overall, then, the theoretical model for defining graphic/written text relations was largely successful. The definition can predict the effect multi-modal texts would have on reading comprehension. Thus, in the relationships defined as concurrence, where the images and words are closely related, the graphic text can make a positive contribution to reading comprehension. In the relationships defined as complementation, where the graphic text added to or augmented the information given in the written text, rather than repeating it, the graphic/written text relation do not support reading comprehension because the students can not use images to infer the meaning of the words. Additionally, the research supports Lui's (2004) findings that the graphic/written text relations of complementation may also cause incomprehension /miscomprehension because, again, the images and the words are not closely integrated and the students would not be able to use the images to decipher the written texts.

Therefore, this study suggests, SFG can be effectively used to support reading comprehension for multi-modal texts in the EFL classroom. The principles of a visual approach to systemics (the compositional, representational, and interactive functions) can efficiently be applied to images to

define two distinct types: demand and offer images. Thus, through a series of simple questions, the panels of the Macbeth text could be analyzed and related to the classifications outlined in Kress and Van Leeuwen's (2006) model (see parts 2 and 3). Further, the effects these types of images will have on reading comprehension could be ascertained.

6. Pedagogical Significance of the Findings

This study supports Bhatia (2006) findings that images will not necessarily support reading comprehension in multi-modal texts and that, therefore, teachers need to be given more training on the effects image based texts will have on comprehension. For example, the findings that only concurrent offer images support reading comprehension is important for teacher created multi-modal texts, e.g. textbooks, online learning web sites, power-point presentations etc. If teachers want students to understand multi-modal information quickly and easily, relationships of concurrence should be used. Relationships of complementation, on the other hand, may create comprehension problems for students. Indeed, a future area of research would be to investigate the positive effects relationships of complementation have on students to give teachers a better idea of how to use them.

Moreover, in authentic texts rather than teacher created text, the writers are obviously not concerned with using images to create linguistic support for their readers. Therefore, concurrence will only be used for textual reasons, perhaps to efficiently set the scene for the readers at a key orientating point in the text. Indeed, from an L2 reading comprehension perspective, this graphic/written text relation of concurrence cannot be expected to dominate authentic texts. The majority of the texts are prospective, as they point the reader forward. Repeating key information in concurrent relationships creates redundancy in texts (Unsworth, 2008, p.387). Thus, it is only extensively used in children's books where repetition of ideas can be supportive for young learners.

However, it is of limited use to more mature readers, as readers would become bored if the story repeated itself all the time. Indeed, in texts for mature readers, complementary relationships, rather than concurrent relationships, may be more likely to be used because they can communicate more information and move the text forward as well. Thus, because concurrent graphic/written text relations are limited in authentic multi-modal texts, for example, reading those texts may be very difficult for L2 students because they cannot rely on the images to repeat the key linguistic items. Consequently, being able to analyze multi-modal texts for their underlying graphic/written text relations is an important pedagogical skill which teachers should develop if they are to meet the needs of teaching in modern literacy environments.

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