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**THE ROLE OF GRAPHICS IN READERS' ACCESS AND RETENTION OF  
ONLINE NEWS STORIES**

**A thesis presented to  
Cardiff School of Journalism, Media and Cultural Studies  
University of Cardiff, Wales  
United Kingdom**

**A submission presented in partial fulfillment of the  
requirements of the University of Cardiff for the degree of  
Doctor of Philosophy**

**By**

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May 2006**

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## ACKNOWLEDGEMENTS

First and foremost, I must thank ALLAH, my God to whom I devote this work. *Alhamdulillah.*

Special thanks and appreciation to my supervisor, Professor Patricia Wright from Cardiff School of Psychology for her support, patience and valuable academic advice at all stages of this research. Without her support, this research would not be materialized.

I would also like to extend my gratitude to the Universiti Kebangsaan Malaysia for giving me opportunity to carry out this study. My special gratitude goes to the Dean of Faculty of Social Sciences and Humanities, Professor Dr. Mohamed Yusoff Ismail and the Head of Media and Communication Studies, Professor Dr. Mohd Safar Hasim. I also would like to thank to those people who directly or indirectly help me in the course of this research project.

I dedicated this work to my husband, Mohd Azlan Baharudin Zamani for his love, support, understanding and encouragement, and my endless love to my three kids, Muhammad Ariff Azhan, Nur Alia Sabrina and Muhammad Ali Imran who make my life truly joyful and meaningful. Last but not least to my mum, Hjh. Ani Abdullah and parents in-law, Hj. Baharudin Zamani Hj. Mohd Yusof and Hjh. Halimah@Ainon Mohamed, family members and relatives in Malaysia and Singapore for their prayers of my success.

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## ABSTRACT

*There is evidence that pictures in text serve various functions, with a potential impact on attention, affect, and cognition. Research on how people read news stories has shown that text accompanied with threatening or negative images influenced readers to read news stories compared to news without pictures. Other research, e.g., by Educational Psychologists, has shown that pictures which explain the text content (here called information graphics) can help people remember that content. So two issues arise, both of which are addressed in this thesis. One is whether information graphics would also encourage people to read the story, and the other is whether the more emotional graphics (here called human interest pictures) would also help retention, perhaps by increasing the reader's motivation. These issues were explored across three experiments in which 88 students participated. The first experiment presented four news stories in a controlled order and confirmed the beneficial effect of information graphics on retention, and suggested that human interest pictures could be equally effective. The second experiment let readers choose the order of reading the news stories and found information graphics increased retention more than human interest pictures, which were better remembered than news stories with no pictures, but picture category had no effect on the order in which stories were read. The third experiment let readers choose only two of the stories and found human interest pictures increased the likelihood that people would choose to read a news story, compared with information graphics. The differences among the experimental findings were attributed to variations in methodology. It can be concluded that human interest pictures and information graphics are most effective for different purposes, and that online news stories could usefully incorporate more pictures. The implications for future developments in digital communications are discussed.*

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## CHAPTER ONE

### INTRODUCTION

#### 1.0 The Internet and online news

The importance of the Internet as a channel for distributing news that has a global reach is undeniable, considering the tremendous growth in usage of the medium by individuals and organizations around the world. In June 1999, the number of web sites on the Internet was estimated to be 6.6 million, and by January 2000 the number had risen to nearly 10 million (Netcraft, 2000). A study for Freeserve revealed that the Internet was the third most popular source of news, views and entertainment for British people after television and radio but before newspapers and magazines (Times of India, 2002). Traffic data released by Nielsen/NetRatings (2002) showed a similar trend: from May to October 2002, all the major news sites in the United Kingdom experienced some increase of unique users, led by news.bbc.co.uk with over three million unique visitors in June.

The increasing use of the Internet shows the demand of an online newspaper as a new medium for information dissemination. Many organizations and individuals have become enthusiastic about the potential of communicating through the Internet. As a distinctive communication medium, the Internet stands as the single largest source of information available anywhere in the world. In September 2002, 34.3 million people in United Kingdom were online



and 63% out of that number go online to look for information (Nielsen-Netratings, 2002). As more people become involved in this new medium of communication, traditional print and broadcast media organizations struggle to take the opportunity to present their news online and reach mass audiences. According to the World Association of Newspapers (2001), the number of American newspapers with an online version rose from 1,149 in 1999 to 1,207 in 2000. In Europe, the same trend was recorded: in Germany, 232 newspapers were present online in 2000 (up from 179 in 1999); in Spain, the difference was between 29 and 85. In Australia, 172 newspapers had a web edition in 2000, a considerable surge from 122 in the previous year.

The Internet becomes a great source of news because it can be accessed twenty-four hours a day and readers do not have to wait for a newspaper to find the story that interests them. Readers have the power to choose directly and immediately from a great variety of content and not rely on the narrow selections of a newspaper editor. This indicates that readers are no longer constrained to traditional newspaper formats that give them a certain order to follow for the presentation of information.

Although readers have a new way of accessing news on the Internet, the content of the news remains the same as its print version. Ziegler (1995) claimed that the early online newspapers were seen as versions of the printed editions because producing online publications was expensive and required new staff and equipment. Many news organizations do not have staff with multimedia capabilities and backgrounds and are likely to hire reporters

similar to those who have worked for the print operations, where the emphasis is on the written word; graphics, images, audio, and video are not part of their training. Based on these constraints, it seems appropriate that most online news sites simply transfer the content of the print newspaper online (Barnhurst, 2002).

Pavlik (2001, p. 43) also noted that although news content on the Internet has been evolving through three stages, many news websites are still dominated by the first stage in which the online content is the same as the print version. In stage one, online journalists mostly just republish, or “repurpose” content from their print editions. In stage two, which is gaining momentum and characterizes most of the better news sites, the journalists create original content, augmenting it with additions such as: hyperlinks to other web sites; some interactive capabilities, such as search engines and electronic clickable indexes where the reader uses a mouse to select different content; some multimedia content, such as photos, video, and audio; and some customisation of sites and information, where readers create their own personal news categories, stock listings, and other content.

Stage three is only beginning to emerge, and only a handful of sites have attempted to enter it. This stage is characterized by original news content designed specifically for the web as a new medium of communication and frequently of increasingly specialized focus, with full awareness and treatment of the Internet as a legitimate medium of news delivery, a willingness to break news online aggressively and to rethink the nature of a community online,

and, most importantly, a willingness to experiment with new forms of storytelling, which allow the reader to enter and navigate throughout a news report rather than simply look at it in linear fashion, as is the case with traditional news reporting, still photography, motion video, and audio.

According to Peterson (1997), there is an assumption by those using the online services that the material found online is exactly what would have been found on the same day in that news organization's printed edition. They found that print publications typically produce web sites that contain the same stories as the print version, placed in a very basic web design that is easy to navigate.

Many critics of the change from print to online have pointed out that newspapers are not using the new technology to its potential (Outing, 1998) and are not taking advantage of special features of the World Wide Web such as interactivity, hypertext, and multimedia (Cochran, 1995). They argue that daily newspapers have not made necessary changes in the way they collect and distribute news to stay ahead (Lasica, 1998). Newspapers are following the old newspaper guidelines of presenting news every 24 hours instead of continuous updates, that they are just creating "shovelware" – a term for the process of taking their print edition and reproducing it on a web site (Cochran, 1995).

Although online newspapers still have many ties to traditional print newspapers and demonstrate a print-oriented design, with improvements in

technology, more are incorporating elements such as audio and video, animated graphics and moving text, and full colour web sites as opposed to print's traditional black-on-white. The result of this rapid evolution is a powerful new medium that has the potential to provide readers with information at a speed and extent not possible in the traditional form.

In view of this Internet revolution, pictures have an important part to play and are obviously significant to the way the web pages are read. The web is, after all, a visual medium and if pictures are misused pages will be perceived negatively. It becomes important to study the effects of pictures in capturing readers' attention and retention of the messages. If a picture is one of the most attracting elements, it would be helpful to know which types of picture will influence readers to access the news stories, and what types of picture will help readers understand and remember the news. For this reason the influence of pictures on access and retention is worth investigating, and is the focus of the present research.

### **1.1 Interactivity and online newspapers**

Interactivity is generally assumed to be a natural attribute of face-to-face conversation, but it has been proposed to occur in mediated communication settings as well. For example, the phenomena of letters to the editor, talk shows on radio and television, listener participation in programs, and in programming are all characterized by interactivity (Rafaeli, 1988, p. 110).

In online journalism studies, interactivity is a vital concept because it holds the key to understanding the unique characteristics and processes of interactions between audience and interactive information on the web. Stromer-Galley (2004) discusses how the different types of interactivity that may occur online can be categorized in two ways: interactivity as product and interactivity as process.

*i. Interactivity as product*

This type of interactivity involves interaction with content, addressing the control that users exercise over the selection and presentation of online content, whether story text, audiovisuals, or multimedia, and other aspects of the interface (Massey & Levy, 1999). McMillan (2002) has referred to product interactivity as a type of user-to-system interaction, while Stromer-Galley (2000) employed the term media interaction. Rafaeli (1988, p. 120) referred to such interactions as reactive communication.

In addition, Steuer (1995, p. 46) defined interactivity as 'the extent to which users can participate in modifying the form and content of a mediated environment in real time'. Thus, product interactivity refers to the extent to which an online news story encourages and facilitates readers in changing how the information is displayed. When graphics accompany news stories the scope for interactivity may be heightened – e.g., the graphics may be viewed as stills or videos or ignored in response to the readers' choice.

As such, interactivity relates to how far individuals in an exchange are able to control and vary their parts in that exchange. Morrison (1998) noted that it is important to understand how individuals perceive interactivity in order to grasp the influence of new media technologies in their lives.

***ii. Interactivity as process***

This type of interactivity may occur online that involves person-to-person conversations mediated by the technology, a process Massey and Levy (1999) labeled interpersonal interactivity. McMillan's (2002) term for the same form of interaction is user-to-user, while Stromer-Galley (2000) has referred to the human interaction that political candidates on their campaign sites seek to avoid.

In relation to the transformations in the production process, editors and designers must become facilitators of the selection of news stories by readers who anticipate being able to jump swiftly to items of interest plus additional background information. There seem to be at least three potential effects on the content and form of news as it migrates to the online environment. First, the news online invites selectivity by the reader based primarily on information in headlines. This means that the web's interactive nature swings control toward the user who will actively make choices about which stories to read because these stories will not be fully visible unless selected. Second, the news online appears to increasingly include users' opinions or views within a

broader spectrum of ongoing conversations (e.g., thematic chat rooms within the BBC news website). Third, online news also has potential to present a micro-local focus, featuring content of interest to small communities of users defined either by common interests or geographic location or both. For example, BBC online news enables people to select topics or geographic regions of interest as well as presenting international news.

Morrison (1998) suggests that hypermedia provides a high degree of interactivity that promotes active learning, therefore will produce more effective learning outcomes. It shows that interactivity has a cognitive effect on human memory. The present study investigates the impact of interactive media on users with emphasis on visual aspects of a website design, specifically the inclusion of graphics.

## **1.2 The importance of graphics in text**

In a news environment, pictures give the news “authenticity”, “credibility”, and “actuality”, and give readers the impression that they are witnessing “something with their own eyes” (Brosius, Donsbach, & Birk, 1996, p. 181). Pictures may serve as an additional headline and point of entry for a story, quickly telling readers what the story is about. Thus, stories with pictures have two points of entry compared to a story without a picture (only the headline). This illustrates that the pictures give support to the headlines by supplementing the information in the headlines.

However, it is important to note that only relevant pictures have a positive effect on memory. This indicates that not all pictures are equally beneficial for text. Levin (1981) differentiated between five main functions of pictures, each of which corresponded to certain processes of knowledge acquisition. The five functions are:

- (1) *Representation*: the picture overlaps the contents of a text and repeats certain contents. It can be used as a redundant source of information to check text comprehension by offering a second opportunity for learning.
- (2) *Organization*: the picture provides an organized, coherent, reductive macrostructure of the text content. Visualizations offer more capacity for other aspects of text processing since the main relations of the text are quickly at hand in the picture.
- (3) *Interpretation*: the picture illustrates text content, which is difficult to understand.
- (4) *Transformation*: the picture offers a mnemonically useful form of recoding, being a kind of visual mnemonic.
- (5) *Decoration*: the picture serves to beautify the text and is not primarily of cognitive importance.

Pictures that serve a representational function may attempt to capture the actors, objects, and events presented in the text. The function of the representation picture is to reinforce the text and to make it more concrete, whereas pictures that attempt to make the text more coherent or comprehensible can be categorized as serving an organization, interpretation,



or transformation function (Levin, Anglin, & Carney, 1987). In contrast, pictures that serve a decorative function produce no positive effects on learning. Some pictures could serve a purely decorative function with little or no relevance to text. The decorative function serves the author or publisher's desire to make a page more attractive, and to capture the readers' attention in order to increase their sales. Pictures of people's faces may often be used for such purposes. Such pictures may be high in human interest, but add nothing to the reader's understanding of the text.

Research has characterized three key relationships among text and picture: redundant, complementary, and supplementary (Willows & Houghton, 1987). Redundant is characterized by substantially identical content appearing visually and verbally, in which each mode tells the same story, providing repetition of key ideas. Complementary is characterized by different content visually and verbally, in which both modes are needed in order to understand the key ideas. Supplementary is characterized by different content in words and pictures, in which one mode dominates the other, providing the main idea, while the other reinforces, elaborates, or instantiates the points made in the dominant mode (or explains how to interpret the other).

In relation to the above picture functions, therefore, considerable care needs to be taken in the choice of pictures and how they are used. Ward (2002) proposed that one of the first decisions to be made about a picture was what should actually be in it and what shape and size it should be. The picture, once selected, has to be edited for size, shape and story content. The

photographer decides what will be in the picture for a variety of reasons – news value, artistic merit, colour and shape, for instance. The editor needs to decide what should be in the picture on the basis of the story and the rest of the page. Frost (2003, p. 115) suggests that if the editor or web page practitioner wish to draw the reader into the page at the bottom or in the middle, they can do so provided they offer the reader a suitable visual cue such as a large and dominant headline or picture or a bright splash of colour. Not only will the editor need to consider the content of the picture but they will also need to consider the shape.

Frost (2003, p. 115) suggested that the shape of a picture could add a lot to the way both the picture and the page look. Changing the shape of a picture from landscape to portrait can often dramatically influences the way the picture looks and this may have implications for the space available for text and ultimately how the page appears. An unusual shape can add drama and interest to a page. A picture that is long rather than wide is therefore unusual and likely to appear dramatic. A tall picture can look dramatic because it presents the reader with a view that is different to the normal one (see Figure 1.1).



**Figure 1.1** An example of tall picture that elicits a different emotion from readers than would arise from another aspect ratio

However, choosing pictures to go with stories and features has become a way of emphasising the areas of the story that will attract the readers. Evans (1978, p. 69) believed that there were three tests for a publishable picture and that a picture without any of them 'should be rejected as junk'. The three tests are: animation, relevant context, and depth of meaning. Animation gives activity and refers to a lively picture that invites the reader to discover more; although Evans makes it clear that by animation he does not mean movement but life: 'a set scowl or a closed eye may give animation to a picture'. Relevant pictorial context helps to explain what is going on or adds extra information and supports the story. The picture's depth of meaning supports the story

adding more information and also brings in the emotional element to help readers feel more about the story.

There is evidence that pictures in text serve various roles. Duchastel (1978) comes to regard pictures as fulfilling any of three main roles: an attentional role, an explicative role, and a retentional role. Based on these three roles, the effect of pictures is to be explained, therefore, in three ways: (1) pictures can attract the reader's attention; (2) pictures can help the reader to understand information that is hard to describe in verbal terms; and (3) pictures can reduce the likelihood that acquired information is forgotten, perhaps as a consequence of an additional encoding in pictorial memory (Paivio, 1971). The following section will discuss the importance of pictures in text according to these three roles.

### **1.2.1 Attentional role**

Attention has been defined in many ways over the years. Mendelson (2001) defined attention as a conscious, directed processing that is attracted by something new in the world. Bargh (1984) and Schneider, Dumais & Shiffrin (1984) divided attention into two processes: automatic and controlled. Automatic processing is a fast, parallel, fairly effortless process that is not limited by attentional resources and is not under direct control of the viewer. Controlled processing is characterized as slow, generally serial, effortful, and capacity limited and is used to understand novel or inconsistent information. People scan the world using automatic processing, and when there is

something novel, they switch to controlled processing to incorporate the new information (Kahneman, 1973).

Graber (1988, p. 107) pointed out that when people pay attention to news, they process stories that seem interesting, simple to understand, and believable. In this situation, controlled processing occurred where people deliberately reject unwanted information for personal reasons, because of the nature of the story or because of its style of presentation. Some stories may be rejected because they contain disturbing information, some because they are perceived as being too complicated, some because of scepticism about sources (especially politicians), and some simply to save time. This indicates that much of the news may be either ignored or given only partial attention.

If this is the case, how do various media capture people's attention? Graber (1998) suggested three main cues alerted readers to whether particular news stories might be of interest to them: media cues, key words and social cues. Media cueing involved prominence, lengthy treatment and, most importantly, repetition (frequent coverage). Key words acted as verbal cues in scanning newspapers. Social cues refer to topics or issues that were current that led readers to attend to related news stories.

From these three cues, the one that is of interest in the present study is media cueing, which refers to the use of prominent elements such as graphics. Studies have shown that graphics were used as text supplements or as layout enhancements with the intention to attract as much as possible the reader's

attention to the news (Mendelson, 2001; Garcia & Stark, 1991). A study by Garcia and Stark (1991) on how the eye moves in a news page provides the evidence of selective reading induced by a graphic. The path of the eye follows and the places it stops provide valuable insights into how readers look at the information presented on the page. In Garcia and Stark's study, participants were exposed to one of two versions of print newspapers decorated with numerous photographs differing in size and proportion. Their findings showed that readers were more attracted to banner advertisements or photographs than to other forms of artwork. And readers were attracted to enter the news page by looking at the larger pictures and then moved to the rest of the contents in the news page. It indicated that pictures attracted readers' attention and motivated them to read the story. The use of pictures with an attentional role will be described in detail in Chapter 2.

### **1.2.2 Explicative role**

Besides having an attentional role, there is evidence that pictures can have an explicative role, helping readers understand the information that is hard to describe in verbal terms. Gibson (1991) suggested that pictures can tell some kinds of stories far better than words, and also can be used as strong lures to attract readers to text matter. This belief does not limit pictures to the role of attention getting but suggests that the pictures help readers to understand the information much better than the words alone.

De Wolk (2001) suggested that if there was a picture in a story, the story needed to refer to that picture in some way so that the reader connected the

two. If the picture did not fit the words, De Wolk suggested the human brain automatically favoured the picture and rejected the words. As a consequence, the picture may confuse the readers and there was a failure in storytelling.

Frost (2003) says that, as one of the key elements of a page, it is pictures that draw readers into a page and help to guide them through the page and the material on it. There appears to be a popular notion that verbal information that is not generously peppered with riveting graphics is dull and boring (David, 1998). If this notion persists and if learning is driven by news images, image-rich concrete stories should have a significant edge over image-poor abstract stories. The addition of an image might offer concreteness to an otherwise abstract story and in turn improve recall (David, 1998). This explicative role can be seen mostly in text that needs further explanation such as in educational textbooks. The details of the explicative role will be described in Chapter 3.

### **1.2.3 Retentional role**

Studies have shown that graphics have a potential impact on attention, affect, and cognition (Levie & Lentz, 1982). Graphics such as diagrams, maps and charts were used with the intention to foster the reader's understanding and retention of the text (Stark & Hollander, 1990; Griffin & Stevenson, 1992). Researchers in education and psychological studies have shown that adding closely related, supportive illustrations to textual information improves learning performance. Mayer and Gallini (1990) found that illustrations helped college students with low prior knowledge of automobile mechanics to recall textual

explanatory information and to solve creative problems. The illustrations helped explain information that was presented by the verbal medium. It appears that supportive illustrations allow learners to build cognitive connections between the verbal and pictorial information.

However, there has been a concern with whether readers learn more from text, pictures, or a combination, and which medium they prefer. People may prefer a medium in which they do not perform well, or there may be “performance-preference-tradeoffs” as suggested by the psychologist (Schriver, 1997, p. 411). This means that people may like pictures but learn little from them. They may prefer words but learn more from pictures, or they may prefer pictures but do just as well with words and pictures. The importance of preference in the context of online news stories is worth investigating because it will determine the types of pictures that influence readers’ access and retention of online news stories.

The above discussion shows that pictures have been used to serve three different purposes. Journalists used pictures, which served an attentional role, whereas educational psychologists used pictures that served an explicative and retentional role.

### **1.3 The different uses of graphics in journalism and psychology**

In order to evaluate whether graphics are beneficial to processing of text, it is first necessary to differentiate the types of graphics that are used in both disciplines. Sargent (2005) pointed out two categories of graphics that



influence selective exposure to online news stories. The two graphics categories were: image affect and image specific. These two graphic categories will be considered in more detail.

### **1.3.1 Image affect**

According to Sargent (2005), image affect referred to the images that produced an emotion or affective reaction that stimulated greater and more deliberate cognitive processing of the following text. The majority of studies focusing on this type of image have shown that the use of highly stimulating images (i.e. pictures of events) that elicit strong feelings, whether positive or negative, on the part of the viewer, significantly increase the viewer's ability to recall that particular news item (Gunter, Furnham, & Gietson, 1984; David, 1996; Lang, Newhagen, & Reeves, 1996). One study even suggested that the use of deviant images, or images that do not fit the viewer's expectation (e.g. "man bites dog" as opposed to "dog bites man"), can increase the reader's recall of the story by causing increased interest in the story and, therefore, increased attention (David, 1996). The deviant and highly stimulating images increase comprehension and recall because the reader spends more time thinking about the story as a result of the image.

### **1.3.2 Image specific**

The second image category proposed by Sargent (2005) is image specific that refers to the complexity of the images. According to Sargent, the amount of attentional focus given to a specific image will vary as a function of image complexity. More complex images would require greater attentional focus and

would yield longer self-exposure time. The image specific selective exposure idea is consistent with the image dominance evidence reported by Garcia and Stark (1991). It also offers a potentially viable explanation for Zillmann, Knobloch and Yu's (2001) studies, where the selective exposure effect was observed only when text and images were presented together. This means that the news stories should have a high degree of overlap or redundancy between the image and the text.

From these two categories of images proposed by Sargent (2005), there are two types of graphics frequently used by journalists and educational psychologists: human interest pictures and information graphics. The human interest pictures (which represent the image affect), are often used by journalists to encourage people to start reading the story, whereas the information graphics (which represent the image specific) are often used by educational texts to foster the reader's understanding and retention. Further explanation of how journalists and educational psychologists used these picture types will be reviewed in Chapters 2 and 3. The following section will discuss the type of graphics used in British online newspapers as an example of graphics used by journalists.

#### **1.4 Type of graphics used in British online newspapers**

Evidence that British online newspapers use graphics in their news front page is shown in Table 1.1. From the nine online newspapers examined (as of Sunday 22<sup>nd</sup> May 2005), only one (Daily Express) did not associate any graphic in their news either in the front page or news page. The other online

newspapers associated a human interest picture either with their front page or news page or both and only one (Daily Mail) used an information graphic in their news front page.

**Table 1.1**  
**The use of graphics in front pages of nine British online newspapers**  
**(May 2005)**

Online Newspaper	Number of pictures		Location of pictures	
	Human interest	Information graphic	Front page	News page
Daily Telegraph	17	-	✓	✓
Daily Mirror	11	-	✓	✓
The Sun	9	-	✓	✓
The Sunday Times	7	-	✓	-
Guardian Unlimited	3	-	✓	-
Independent	3	-	✓	-
The Observer	1	-	✓	-
Daily Mail	-	1	✓	-
Daily Express	-	-	-	-

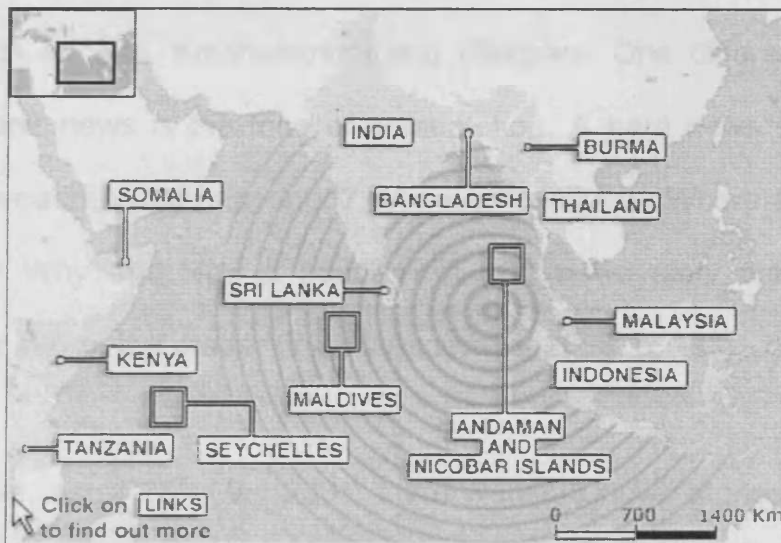
Although Table 1.1 shows that the human interest pictures always appeared in the news front pages, this does not imply that the information graphics were not given attention by journalists. Griffin and Stevenson (1996) noted that more newspapers began using information graphics in the 1980s, both to enhance page design and to provide information in an alternative way. In the 1990s, researchers have begun to tackle the issue of how information

graphics and text work together in a newspaper context (Griffin & Stevenson, 1996). This is to show that journalists used both graphics (human interest and information graphics) in delivering the information to their audience. Although there were varieties of news stories presented on news websites studied, ranging from soft news to hard news, most of them were presented with human interest pictures. One possible reason of the lack of use of information graphics in British online newspapers within the time frame of the analysis was because the events reported were purposely to inform readers and not to educate them.

Therefore, if the purpose of the news was to inform readers and encourage access, the stories were always associated with human interest pictures; whereas if the purpose of the news was to help readers understand and remember the facts in the story, then they were possibly presented with both human interest pictures and information graphics. The use of both picture categories can be seen, for instance, in the disaster news such as tsunami. The destroyed buildings and scattered dead bodies (Figure 1.2) represented the human interest picture while the maps (Figure 1.3) represented the information graphic. Both pictures were presented together in the same story in order to inform readers about the consequences of the tsunami and the places that were affected by the tsunami.



**Figure 1.2** Picture of destroyed building and scattered dead bodies



**Figure 1.3** Maps of the area that was affected by tsunami

These pictures illustrate that document designers have an important role to play in defining what it means to be effective when integrating text and graphics in online news stories. Readers on the web are confronted with text and graphics that are presented in various ways. Some of the time, words and pictures are used in pairs to evoke an idea, but most of the time, words and pictures are integrated as part of the body text in order to help readers

understand the content. This also applies in educational psychology where the use of information graphics was intended to help readers understand and remember the texts.

### **1.5 Types of news**

Journalists recognize two major types of news: hard and soft. Hard news usually refers to serious and timely stories about important topics (Fedler, Bender, Davenport & Drager, 2005, p. 131). Politics, war, economics and crime used to be considered as hard news. Journalists call hard news “spot news” or “straight news.” Soft news usually refers to feature or human interest stories such as arts, entertainment and lifestyles. One difference between hard and soft news is the tone of presentation. A hard news story takes a factual approach: What happened? Who was involved? Where and when did it happen? Why and How it happen? A soft news story tries instead to entertain or inform the reader (Itule & Anderson, 2003, p. 123).

For example, as of 28<sup>th</sup> May 2005, there were 25 news stories in the Daily Telegraph, 9 were hard news and 16 were soft news. In terms of pictures that were associated with the news, only 44% stories used human interest pictures (i.e. 16% in hard news and 28% in soft news). For this newspaper, there is a 50:50 chance that a news story will have a picture, no matter whether the news is hard or soft (see Table 1.2).

**Table 1.2**  
**Numbers of graphics that appeared in 25 stories reported on the *Daily Telegraph* news website as a function of hard and soft news**

News	Picture category		
	Human interest	Information graphic	No picture
Hard news	4 (16%)	-	5 (20%)
Soft news	7 (28%)	-	9 (36%)
<b>Total</b>	<b>11 (44%)</b>		<b>14 (56%)</b>

### 1.6 Purpose of this study

Until recently, there was little research on the effectiveness of messages presented on the web or on the effects of using visual elements in a web presentation (e.g., Garcia & Stark, 1991; Sargent, 1998; Sargent & Zillmann, 1999; Gibson & Zillmann, 2000; Zillmann, Knobloch & Yu, 2001; Knobloch, Hastall, Zillmann & Callison, 2003; Sargent, 2005). Much research exists concerning the effects of mass media on audiences, and how the public uses mass media for their own purposes. Since the web is used to present news stories, it is important to determine how incorporating design elements such as pictures will influence readers to read the news. In 1990s, newspapers increasingly turned to graphics to convey information as a way to inform, rather than bore readers. Only a handful of researchers (e.g. Pasternack & Utt, 1990; Stark & Hollander, 1990; Griffin & Stevenson, 1992) had begun to

tackle the issue of how graphics and text work together in a newspaper context.

Although it has been shown that different graphics served different purposes such as the human interest pictures in journalism studies and the information graphics in educational psychology, a question of interest here is do all pictures attract readers to access and read the story and at the same time help them to gain knowledge from the news?

### **1.7 Research questions**

The purpose of this study is to examine the effects of two graphics categories, i.e., human interest pictures and information graphics, on reader's access and retention of online news stories. Are readers attracted to access the news more through human interest pictures than information graphics? Do both human interest pictures and information graphics help readers remember the news stories? The present study will compare the extent to which both graphics categories influence readers to access and remember online news stories.

In the hope of bringing some clarity to the above issues, the present study will investigate the influence of human interest pictures and information graphics in a news front page on the likelihood that readers will access specific news stories and remember the news that they have been exposed to. The central questions of the present study are:

- a. Does picture category influence the access of online news stories?



- b. Does picture category influence the retention of online news stories?
- c. Does pictures category influence the reading time of online news stories?
- d. Does picture category influence the reader's assessment of the overall design quality of the online news story, including their assessment of the text itself?

It is hoped that the answer to these questions will offer guidelines for journalists wishing to incorporate different visual elements in their news stories.

## **1.8 The structure of the thesis**

It is going to be shown in Chapter 2 that online news stories tend to be accompanied by graphics of only one kind, i.e., human interest pictures. The reason for this choice is that they are thought to influence readers' willingness to access news stories. And this access effect applies across the range of news stories, hard news (e.g., economics, crime) and soft news (e.g., health, science/nature). In contrast, Chapter 3 will show that research by educational psychologists has found that a different category of graphic, i.e., information graphics, helps readers understand and remember the text.

Chapter 4 describes the common features of the experimental design and materials used in the three experiments reported in this thesis. Chapter 5 reports data on hypothetical access and actual retention. Chapter 6 reports data on real access, and separates the effects of pictures on picture viewing

and text reading time, relating this to retention. Chapter 7 reports data showing how pictures can influence readers' choices to completely ignore certain news stories. Chapter 8 discusses these findings, their limitations and suggestions for future research, and summarizes the conclusions from these studies. Chapter 9 considers the role of pictures in the future development of online news stories given the foreseeable changes in technologies and in the way people choose to access online news.

## CHAPTER TWO

### GRAPHICS: A JOURNALIST PERSPECTIVE

#### 2.0 Introduction

There are many ways to present information visually in the media. Popular media such as newspapers, magazines, and television news use a variety of formats to present information to their readers and viewers. In the 1980s, print media were characterized by increasing use of graphics that editors turned to not only as a design element but also as a way to convey information (Berry, 2001). It has been assumed that readers can better understand a complex news event when it is visually presented, along the lines of a picture being worth a thousand words. Unlike print media, graphics are a must in broadcast media especially in television news, which is mainly about images. In fact, studies have suggested that because broadcast news is brief and entertaining, it is cognitively processed at a lower level than print news, which could account for the reason it is recalled at a significantly lower level (Lang, 1989; Wicks, 1992). For this reason, more recent studies have focused on the broadcast source, hoping to find ways to improve presentation and thereby increase comprehension and recall. These studies focused on pictures and have shown that viewers exhibit better retention for broadcast items that use highly visual information when the visual content is closely related to the material being spoken than for items that use the “talking

head” genre (Brosius, Donsbach, & Birk, 1996; Edwardson, Kent, Engstrom, & Hofmann, 1992). Studies also have shown that when highly redundant graphic presentations are used with verbal presentations, recall is significantly improved (Griffin & Stevenson, 1996). Reasons for this improvement have been attributed to incorporating “multiple channels” of processing information or presenting the same information or explanatory information using different methods of delivery (Berry, 1983; Booth, 1970-71).

Clearly, whether reading newspapers and magazines or watching television, graphics form a large part of how readers learn about their world from many different and unusual points of view. Graphics can potentially create a sense of direction, orienting viewers and helping them decide where the action starts, how it progresses, and where it ends. Graphics undoubtedly have the potential to convey the message visually to the audience.

In an online news environment, the most common ways of helping readers appreciate what news is available on news websites are to provide pictures and headlines. Editors normally provide the readers with pictures and headlines that once clicked will link to the full story. These two elements have their own way of attracting readers to the news. For example, a dominant size of picture is rated as more important (Huh, 1994) and can attract readers' attention (Garcia & Stark, 1991), while a line of catchy precise words in a headline can act as titles and

lead-ins that are set above and clearly separate from the rest of the text. The headline naturally attracts the eye of the reader (Boduch, 2001).

The nature of the web, that allows selectivity and scanning, makes the way readers access the online news stories differ from print news. However, the difference between the web and print is not so much in the content but in the structure. In traditional print media, news stories are organized in a linear manner and generally designed to be read from beginning to end. In an online environment, accessing news stories demands inspection of the headlines, and it is through this inspection that pictures exert their influence on reading decisions. If a picture is buried in the text, it might never be given a chance to influence curiosity and attention. For example, once a particular article is selected, novel in-text pictures are likely to foster curiosity and thus motivate continued reading (Garcia & Stark, 1991). In other words, the web, with its node and link structure, facilitates access and reading according to the readers' preferences. Readers can more easily choose to read any article in any number of ways instead of in a single order determined by the fixed structure of a traditional print text. However, the decision on how and what news to read will depend on the readers' information needs and their experiences.

In view of how and what news to read, Levie and Lentz (1982) stated that readers do look at text illustrations in most situations, but they usually do not 'study' the pictures unless prompted to do so. This fits with the idea of pictures

simply being a second headline to be briefly looked at once and then moved past. It shows that in most newspaper reading situations, there may be no need to remember all the details of pictures because most people choose to read and to keep reading only when they believe there will be some benefit in doing so.

Furthermore, Berkenkotter and Huckin (1995, p. 31) pointed out that readers normally look for the most surprising, most newsworthy information first (i.e., the headline), then, if interested, they read further. Berkenkotter and Huckin suggested that readers need to have knowledge about where to look for the information they need, knowledge about what the elements of the medium are, knowledge about the sequence to follow when reading the medium and knowledge about how to connect the information in each medium. But if the importance of the news stories was flagged by editors with the incorporation of a dominant picture, then readers have a clue that the news is important and worth reading.

The benefit of incorporating pictures in news stories is undeniable, and it is well documented that the addition of pictures to text leads to superior information acquisition (Graber, 1990; Katz, Adoni & Parness, 1977; Madigan, 1983). However, in an interactive medium that involves flexible combinations of different forms of written or spoken text, static or animated pictures, sound and music, the question of how readers use pictures to access news stories has not been widely explored. Previous research has revealed that threatening or negative images

help to attract readers to read specific stories in newspapers and other news media (Mundorf, Drew, Zillmann & Weaver, 1990; Newhagen & Reeves, 1992; Gibson & Zillmann, 2000; Sargent, 2005). When individuals encounter a potential threat, they are more cautious with subsequent information and this will lead to careful reading of that particular news (Nabi, 1999; Zillmann, 1998). The negative image serves as an extension of a surveillance function (Lasswell, 1948) that demands the readers' attention in order to monitor their environment. The desire to know further details of what happened in society can be satisfied by further reading the associated text.

This indicates that readers decide for themselves the type of information they prefer to read and the order in which they process different types of information available in online news. The ways readers prefer to access, interact with, and interrelate information is distinct based upon their set of experiences and abilities. In other words, readers have full control over the information available online as they navigate and input the information at a pace that matches their internal comprehension processes. This distinction gives an opportunity for editors to use pictures as a way of attracting readers to their news stories.

In regards to research on picture effects, only a few researchers have investigated the influence of pictures on access (e.g., Sargent, 2005; Knobloch, Hastall, Zillmann & Callison, 2003; Zillmann, Knobloch & Yu, 2001; Zillmann &

Bryant, 1985). However, these researchers defined “access” differently according to their research purposes.

## **2.1 Access: A definition**

In order to gain a clearer meaning of what is access, the following definitions will give an overview of the term “access” that has been defined differently by previous researchers. According to Slatin & Rush (2003), accessibility is the readers’ ability to navigate and use a site and its resources as effectively as possible. This definition refers to a general way of entering to the Internet that is based upon the readers’ knowledge and experiences. That is, readers who know how to use the Internet effectively will get the most from their navigation. However, this definition seems too broad and general in the sense that it looks at the way people use the Internet but does not clearly define how the features of the Internet will influence readers’ information searching.

From Zillmann and Bryant’s (1985) point of view, access was defined as a selective exposure to various types of information. They suggested that access is a phenomenon involving any behavior that is deliberately performed to attain and sustain perceptual control of particular stimulus events. This means that people tend to limit themselves to only choosing the information that is really important to them. In a situation where the use of the Internet is to fit the purpose of information searching and gathering, this definition seems to give more specific focus to how readers react to a variety of information available in the Internet. It



is assumed that readers will selectively expose themselves only to the information that will fulfill their information needs. This definition is now widely accepted and can be seen in studies where researchers have defined access, or in their terms “selective exposure”, in terms of reading time (i.e., duration of access) not just initial access. For example, Zillmann, Knobloch and Yu (2001) explored access within printed newsmagazines as selective exposure to a harmless photograph (innocuous) or a photograph depicting victimization (agonistic) that were associated with a text. They examined how readers chose to read a printed news story based on the picture associated with the text. They found that text with innocuous photograph was selectively attended and processed for a longer period of time than the same text of articles without images. Moreover, the finding indicated that more extensive information processing was spent for text of articles accompanied by photographs depicting victimization.

In a similar vein, Knobloch, Hastall, Zillmann, Callison (2003) referred to access as selective exposure to threatening or innocuous images that were associated with both headline displays and the text of online news stories. Their findings demonstrated that the incorporation of threatening images along with the display of headlines was the most effective way to encourage choice of the news stories by readers.

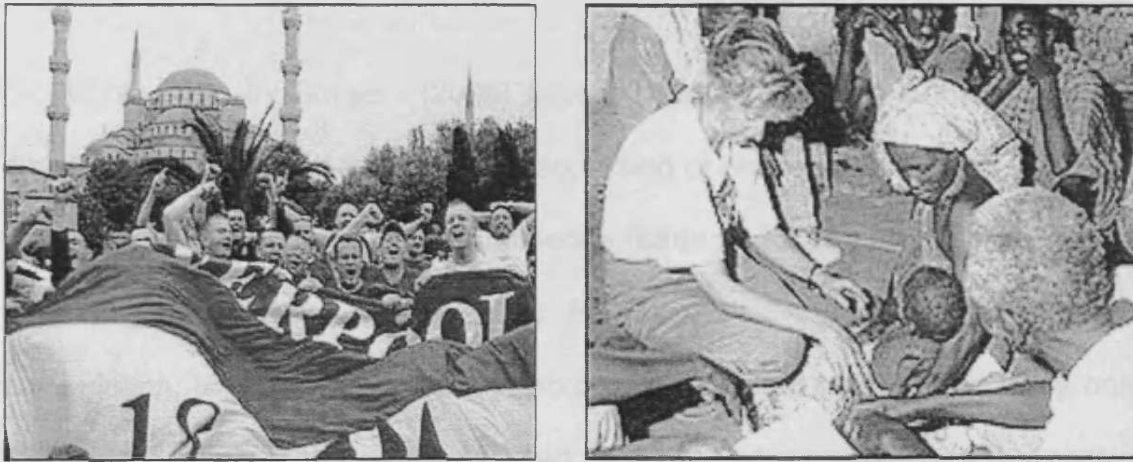
For the purpose of this thesis, access refers to readers' initial selection of a story from an online news front page. It has been proposed that people do not read information on the Internet – they scan (Nielsen, 1997). Home pages that are made up of scannable headlines and associated pictures, allow readers to quickly decide whether the information interests them. Therefore, access through headlines associated with pictures is one focus of interest in this thesis because the incorporation of pictures in the online news front page might support the headlines and therefore influence access to the news stories.

## **2.2 Effects of human interest pictures on access**

As has been discussed in Chapter 1, readers chose to read the news stories associated with pictures that contained an element of attraction. This indicates that attraction has relation with access. Pictures that serve an attraction function attempt to capture the actors, objects, and events presented in the text. One type of picture that serves the attraction function is the human interest picture. This type of picture can capture readers' attention and furnish valuable information before they get to the first paragraph of the story. Human interest pictures represent some elements from the text by showing what something or someone treated in the text looks like.

Besides the attention qualities of the human interest pictures, they also have an affective element. It has been shown that the incorporation of human interest pictures in text can create more emotion than the text messages (e.g. Lang,

Newhagen & Reeves, 1996; Lang, Dhillon & Dong, 1995). For example, the pictures below represent two different situations presented by human interest pictures. The one on left shows a lively picture with happy mood while the one on right can create a sympathetic emotion in readers (see Figure 2.1). This illustrates two qualities that can be found in human interest pictures.



**Figure 2.1** Examples of human interest pictures with two different emotions

In disseminating news, journalists frequently used these types of pictures in informing and updating readers with the latest information. To attract readers, journalists, as they construct their reports, have to select intriguing story slants or news hooks. By giving emphasis to certain aspects and downplaying others, they can hope to capture and retain the readers' attention to the news (Gitlin, 1980; Tankard, 2001). Pictures are commonly employed in news stories to illustrate a point or points made in the news or to make the layout aesthetically pleasing (Finberg & Itule, 1990). There has been extensive research on text recall as a

function of picture accompaniment (Graber, 1990; Stone, 1987) and on pictures' ability to enhance the news media's agenda-setting effect on readers (Wanta, 1988), but little is known about how pictures influence readers to access one story rather than another. Taken together, while pictures appear popular with many readers (Graber, 1990; Lewis, 1984), the research on picture effects in online news access provides a rather clouded situation.

Recent research by Sargent (2005) gave new impetus to exploring at least the consequences of image-affect on the accessing of online news stories. However, this study looked at how pictures influence readers' access of stories within the news page, not their initial access from a news front page. The image manipulation, if employed, was incorporated on the first page of the story only. There were four image conditions used: text only which served as the control; portrait of the writer of the story which had no relation to the text; a picture illustrating a non-threatening aspect of the story; and a picture reflecting some threatening part of the story. In the non-threatening condition, the pictures showed two babies playing on the beach in full sun; a red 1998 Corvette convertible being driven by a man on an empty road; people enjoying a roller coaster ride, and two men on a fishing boat holding their trophy. In contrast, pictures that vividly and saliently reflected potentially harmful aspects of the story showed a malignant melanoma on a person's arm; a fatal car wreck with firemen, and police officers; an injured person being wheeled into an ambulance with a view of the roller coaster in the background, and several dead fish on a river

bank with large bloody sores. Two of the four filler stories also displayed an image on the first page with the text. The “Name that Dog: Suggestions for Clinton” story was accompanied by a photograph of Clinton hugging his newly adopted chocolate Labrador retriever, Buddy. A picture of a man talking on a cell phone was displayed in the “Cell phone companies giving bandits a new hang-up” story. The other two filler stories did not include pictures and were presented as text only. The pictures used in both threatening and non-threatening conditions, and the two filler stories were categorized as human interest pictures.

In this study, there were 192 students who took part as participants. They were given 20 minutes to read whatever stories they wished from a “Table of Contents” that included only the titles of all eight stories. After the 20 minutes time limit, participants were asked to fill in a test of recall. Results revealed that participants who were exposed to non-threatening and threatening images within the news story spent more time looking at that portion of the news story where the image and text were presented concurrently. Participants in the threatening image condition spent significantly more time on the second and third pages of the stories as compared to those in the non-threatening image condition. This was because threatening images in page one produced an emotion to encourage readers to process deeply the following text in pages two and three that contained no images. The incorporation of threatening images in this study made the news appear more salient and therefore, fostered reading of the next two pages of the news stories. The author concluded that both non-threatening and

threatening images accompanying news stories caused people to spend significantly more time viewing the introductory content (first page) when compared to the same stories paired with a reporter portrait or presented as text only.

There are several reasons to be cautious about Sargent's study in investigating the effect of pictures on accessing online news stories. First, the arrangement of the headlines, which were listed one after another in the "Table of Contents" would have an impact on readers. They would perceive the first story in the list as the most important one and the last story at the bottom as the least important. This perception would yield greater attention and time spent on the top story as compared to stories at the bottom of the list.

Second, in this study participants were free to read any or all eight stories within 20 minutes time limit. With time limitation, participants may have chosen to read the news with threatening and non-threatening images rather than news with portraits or no images because reading of news associated with such 'alarming' images promises to satisfy readers' curiosity (Zillmann, Knobloch & Yu, 2001). Therefore, one should expect that news with threatening and non-threatening images would receive more attention and increased reading time as compared to news with portraits or no images.

Third, the incorporation of a reporter's portrait, which is not related to the text, should be avoided because it might distract readers from understanding the news. Levin (1989) suggests that the incorporation of pictures should relate with the text in order to facilitate storage and retrieval of text content. Adding unrelated pictures does not improve learning, and in fact it may actually decrease learning. It has been shown that unrelated pictures did not improve comprehension and recall of textual material (Levie & Lentz, 1982; Sewell & Moore, 1980) or recall of picture captions (Evans & Denny, 1978). Peeck (1974) found that adding supportive pictures to text helped fourth-grade children retain verbal information, but unrelated pictures made it harder for learners to comprehend the text.

Taken together, Sargent's findings supported a study by Zillmann, Knobloch, Yu (2001) who suggested that photographs, because they contain incomplete accounts of events, inspire readers to search for additional information to provide more complete comprehension of the events depicted. In their study, Zillmann, et. al (2001) examined the consequences of image incorporation in printed newsmagazine text on selective exposure to that text. Three measures of selective exposure were employed. First, the respondent's eye movements were unobtrusively recorded and timed for glancing at images, scanning headlines, and the actual reading of text. Second, unique semantic cues were evenly distributed throughout the manipulated articles, and recall of them was used as

an indication of attention to the preceding text segment. Third, the respondents' retention of the article served as an objective measure of amount of reading.

By using the format of *Time*, *Newsweek*, and similar magazines, these researchers aggregated 12 articles of general interest in an experimental newsmagazine. With text held constant throughout, half of these articles were manipulated, presenting either images of a particular kind or no images. The remaining articles, some with images and others without, were not manipulated.

Participants were free to pick and choose among articles. Perusal time was restricted to 15 minutes, however, and this allowed the assessment of image influence on the selection of manipulated articles, especially on the amount of attention they attracted. The image variation of each of the manipulated articles entailed the incorporation in the text of a story-related innocuous image, or threatening image or of no image in the control condition. Threatening or agonistic images were defined as iconic depictions that signal threats to human welfare, especially when they extend to self, and that show others' acute suffering of harm and the grievous aftermath of destructive happenings. The agonistic images used in this study were images depicting the rescue of a drowning child from raging floodwaters; a combatant in a ball of fire; a close-up of a woman's bloodied face, and an image of firemen dowsing the flames in a dormitory. In brief, this class of images exhibits impending or manifest victimization.



In contrast, images devoid of victimization were classified as innocuous. The innocuous images in this study featured a child apparently in the safety of a shelter, playing with a balloon; two men with virtual reality goggles staring into monitors; calm faces of two persons at the negotiation table, and one image of students enjoying a game of cards. The pictures used either in the innocuous or victimization conditions were categorized as human interest pictures. The findings showed that the victimization images have a powerful influence on the selective reading of associated printed text in newsmagazines, with people being more likely to spend longer reading stories with victimization images.

However, two aspects of the Zillmann et al. study seem problematic and reduce the confidence that can be placed on their findings. There is the involvement of a potential confounding variable. First, they allowed their readers unrestricted access to photographs. As a result, it is impossible to determine if time of exposure resulted from time spent reading the text or time spent gazing at the graphic and potentially emotional disturbing images, or, most likely a combination of the two. The second concern is that the demand characteristic of expecting a test could have interacted with the image. In this study, the participants were told at the beginning of the experimental session that they would be queried about the news magazine. Unfortunately, in such a circumstance it seems very possible that the threatening images could have served as a salient cue for the participant that the text was somehow important and needed particular attention for the expected test.

Knobloch, Hastall, Zillmann & Callison (2003) extended Zillmann's et al. (2001) study on selective exposure from printed to online presentation. An experimental Internet newsmagazine was created and made to look like those available on the web. Interactivity was also as in such newsmagazines; that is, an overview presented headlines, subheads, and images, and participants could click hyperlinks for access to articles as well as hyperlinks in the articles for return to the overview. Participants were instructed to follow their own personal interests in sampling among the articles. Participants were given 8 minutes and the time would not allow them to read all articles. They were told they should feel free to read whatever they wanted and as much of it as they wanted. The same twelve articles as in the previous Zillmann's et al. (2001) study were used, which covered topics of general interest. Six of these articles were manipulated. The overview and the text of the articles were either associated with photographs or not. If associated with photographs, the photographs either conveyed harm (threatening imagery) or were devoid of harm (innocuous imagery). Photographs in the overview were repeated in the associated articles. The remaining six articles were unmanipulated and manifested competing information. Unbeknownst to the readers, the web display logged exposure times (i.e., the times participants spent with the screen pages of any of the articles).

Their results showed that the incorporation of innocuous or threatening imagery in online displays of news headlines and in the body text, increased selective attention to and the likelihood of reading of the articles. The results also revealed

that the incorporation of a threatening image increased the time of selective exposure to the articles as compared to imageless displays. However, the result did not indicate whether the extra time was spent on the graphics or on the text.

Another investigation by Gibson & Zillmann (2000) explored the consequences of informative and potentially alarming images on the reading of associated text. There were two newsmagazine reports, the first report dealt with the conservation of environmental wetlands and the second, entirely fictitious report disclosed a newly identified illness spread by diseased ticks. The report on wetlands was not manipulated and served as a potential covariate. The report on the tick-borne disease was manipulated only in terms of photographic image usage. The news story was verbally identical in all versions. In a control condition, no photographic images were used. The other conditions featured (a) images of two ticks but no images of human victims of the disease; (b) images of two ticks, of two White children, and of one Black child as disease victims; (c) images of two ticks and of three White children as victims; and (d) images of two ticks and of three Black children as victims. The text made no reference to the ethnicity of victims. Again, the human interest pictures were used in this study.

The results established that danger-signaling photographs increased estimation of the risks implied by the news story. The presence of photographs showing disease victims of particular ethnic groups was found to lead to exaggerated perceptions of risks to these groups, despite the absence of textual specifications

of risks to any subgroup of the population. This finding illustrates that readers integrate the information from picture and text.

Wanta and Roark's (1993) study involved having people read and answer questions about a single front-page story as it had appeared in one of 20 different printed newspapers. The topic of the lead story was the same in each newspaper (the failed meeting between U.S. Secretary of State James Baker and Iraqi Foreign Minister Tariq Aziz to avert war in the Persian Gulf), but the presentation of the lead story and other stories on the pages varied greatly. The nine photos that accompanied these stories came from only one category, i.e., human interest pictures. Their objective was to determine whether these categories would have an effect on responses to the story. The nine pictures were: (1) a soldier praying; (2) President Bush at a press conference shaking his fist in anger; (3) U.S. Secretary of State James Baker shaking hands with Iraqi Foreign Minister Tariq Aziz; (4) mugshots of various officials; (5) a Vietnam veteran in a wheelchair giving a "peace sign"; (6) a child on his father's shoulders waving an American flag; (7) President Bush with a very somber facial expression; (8) expressionless President Bush, standing behind a lectern at a news conference, and (9) a jet aircraft. The main dependent variable was how much information was learned from reading the stories. The findings suggested that readers have a limited capacity for storing information. Photographs that do not complement stories can detract from information processing of unrelated stories. Other stories suffer if there is something else on the page worth

remembering – such as an emotional photograph. In the case here, the emotional photograph of a soldier praying distracted readers from other information on the page. The photo was especially memorable because of its emotional content. Therefore, participants devoted memory storage to the photograph, and thus devoted less memory storage to information contained in other stories on the page.

In contrast, a study conducted by Wolf and Grotta (1985) addressed the causal connection between in-text images and attention to the image-associated text. These researchers manipulated the front page of a print newspaper. They instructed 95 students to read a four page newspaper as they normally would and after a limited reading time asked them about a focal article and quizzed their retention of how much of this article they had remembered. The article featured a story about an on-campus dancer who had been awarded a prestigious ballet scholarship. A portrait of the dancer, an action photograph showing the girl dancing, and an artistic photograph that had nothing to do with the story were used in different versions. A text-only condition was not included in the research design. Located above the headline that announced the woman's success was one of the three equally sized square photographs showing either a portrait of the dancer, the dancer midair in the spectacular grand jete ballet leap, or an art display unrelated to the story. Respondents were asked whether they had read the story thoroughly, casually, superficially, or not at all.

Results showed that the portrait of the dancer fostered the most reading, with 82% of the students in this group reporting thorough attention. In contrast, the unrelated art display prompted the least reading, with only 48% giving thorough attention. The photograph of the grand jete led to intermediate reading (percentage not reported). The findings of the recall questions produced similar results. The highest recall (70%) was apparent for the dancer portrait photograph; whereas, both the action and artistic photographs produced the lowest recall (both at 42%). The results of this study illustrate that the content of photographs can increase readership of stories they accompany and subsequent recall of facts from these stories.

As a first step in exploring the role of images in news reading, Wolf and Grotta's study was undoubtedly imaginative and intriguing. Their results were disappointing, however, and compromised by alternative explanations. The grand jete photograph had the qualities deemed important in photojournalism (Evans, 1978) but failed to draw much attention to the text. The likely explanation of this failure, as well as for the comparatively effective portrait, was actually provided in the data. The dancer was apparently known to the students and recognized in the portrait. As a result, 24% of those seeing this image declared knowing her as the reason for reading the article – this is in contrast to only 7% for both other image conditions. More importantly, because the design did not include a no-image control condition, the effect of the two text-related photographs on reading was not discernible. The unrelated image defined an unacceptable control

because it may have bewildered readers and made them look for corresponding text. One might also question the validity of the retrospective assessment of the amount and care of reading. It is therefore, worth examining such issues with measures having greater ecological validity.

In a study using four photos of Clinton in a professional role and four in a personal role (wife), Mendelson and Thorson (2004) showed that photo presence led people to rate news stories with a photo as more interesting than those without a photo. All eight photos were real newspaper/magazine photos that had been published in the *New York Times*, *Washington Post*, *Newsweek*, or *Time* magazine. All the photos used in this study portrayed Clinton engaging in some action, not posed. They suggested that studying how readers use pictures and text is important because they believed that news photographs aid news processing in a variety of positive ways. They investigated whether learning from news depended on an interaction between readers' cognitive styles and the nature of the media stimuli to which they are exposed. They found that media variables, such as picture presence, story-picture congruity, and story content explained only a part of readers' reactions to the newspaper.

This study suggests that learning from a text-oriented environment, such as a newspaper, is best predicted by examining a person's verbalizing orientation. High verbalizing was associated with better recall of stories and photos than was low verbalizing. The best story recall occurred for those high on verbalizing and

low on visualizing. When photos were absent, high verbalizers remembered the most about the stories. Not only did photos not aid them, they actually impaired their retention, presumably by some sort of distraction process. They also found that people who were high visualizers were not aided in text comprehension when using photos. Visualizing did not interact with photo presence or photo-story congruence. It reveals that a person's predisposition for learning from visuals does not seem to be a factor in processing news stories. Learning from the newspaper environment, even one with pictures, is predicted only by verbalizing.

From the above discussion of picture effects, the fact that readers pay attention to relevant words and pictures increased the reading time of the text involved. This showed readers involvement in active cognitive processing, which supported Mayer's cognitive theory of multimedia learning (Mayer, 1997). The cognitive processing occurred when readers organized the information and integrated both the verbal and pictorial. It has been shown that in some contexts readers learn more deeply from words and pictures than from words alone (Gibson & Zillmann, 2000).

In summary, the above discussion of picture effects has shown that only one type of picture, i.e., the human interest picture, is frequently used as a way to attract readers to read the text. However, in reality, journalists also use other types of



pictures, such as information graphics, in helping readers to understand the news stories.

### **2.3 Different types of information graphics**

In a most fundamental sense, both text and graphics are systems that allow us to represent information symbolically. Despite the fact that both systems allow for the communication of many of the same ideas, each system is especially well suited for the communication of some kinds of ideas and conversely, poorly suited to the communication of some others (Salomon, 1979). In delivering news to the readers, the editor must then choose from among the available media in a form that will be both intelligible and useful, given the reader's needs and preferences.

Williams and Harkus (1998, p. 34) note that a poor choice of medium affects the reader's efforts to comprehend in at least two significant ways. First, the medium may just be too inadequate to express with either much precision or efficiency the idea the journalist wishes to communicate. Second, should the message be provided via a symbol system different from the one in which the reader finds it useful to represent meaning internally, then readers must translate the message into the preferred – or, as Salomon (1979) notes, “task required” – symbol system. Such translations require the diversion of mental resources and open the door to misinterpretation of the message. In this regards, it is important to choose

a suitable graphic to accompany a news story in order to help the readers understand the message presented to them.

Vekiri (2002) pointed out that there is no standard classification system of graphics, and as a result, the same terms may be used with different meanings from one study to another. For example, Hegarty *et al.* (1991) refer to organization charts and flow charts as diagrams whereas other researchers (Winn, 1987) consider them as types of charts.

However, there are other researchers who have classified the visual displays into several categories. Kosslyn (1989, p. 186) categorized four common types of visual displays: graphs, charts, maps, and diagrams, which differ in terms of what and how information is communicated. Based on these categories, the thesis will concentrate on three types of information graphics – diagrams, maps and bar graphs that are often found in news stories.

### ***i. Diagrams***

Diagrams have been shown to be effective in facilitating text learning. Robinson and Kiewra (1995) reported that students who studied a diagram in addition to text, as opposed to studying only the text, scored higher on a test of concept relations. Gick (1989) proposed two functions of diagrams: encoding and retrieval. The encoding function of diagrams was to represent the convergence schema of the text in visual form. The second function of diagrams was to initiate

retrieval of prior information relevant to the task. This means that diagram can act as a memory aid to reactivate the representation of information that has been previously read and presented. Furthermore, a diagram can be a source of new information that is not given in the text (Hegarty & Just, 1989).

In the thesis, a biological diagram showing the procedure for a surgical operation may help readers understand the story of how a potentially deadly hernia can be corrected while the baby still in the womb. Readers will easily identify the facts given in the text with reference to the diagrams associated with it. In general, diagrams can provide a valuable contribution to readers' learning but their effects are contingent upon two important factors: the characteristics of the displays themselves and the characteristics of the readers who use them (Vekiri, 2002).

Levin *et al.* (1987) noted that displays must meet the demands of the learning tasks in order to be effective. For example, when the goal is to help readers understand cause-effect relations or how systems behave, diagrams need to show not only the components of the systems but also how they interact and interrelate (Mayer & Gallini, 1990). In contrast, visual displays are not effective when used without guidance or explanations. Rieber (1991a) found that students often do not know what information they need to observe in a display, and they are likely to draw wrong conclusions from what they see.

It appears that learners' prior knowledge mediates the effects of explanative diagrams but its role is not straightforward. Mayer and Gallini (1990) found that students with low prior knowledge about mechanical devices benefited more from the diagrams than high-knowledge students. However, the research of Hegarty *et al.* (1991; Hegarty & Just, 1989, 1993) provided a different perspective. In their studies, Hegarty and colleagues found that individual differences in prior knowledge affected comprehension and the quality of readers' understanding. High-knowledge readers were more capable of locating the relevant information in a diagram and extracted information more selectively (Hegarty & Just, 1989). In contrast, low-knowledge readers did not know what parts of the system were relevant to its functioning and could not develop a representation of the system from the diagram alone (Hegarty & Just, 1989, 1993). Rather, they needed direction from the text to locate and encode information from the diagram (Hegarty & Just, 1989). This showed that high prior knowledge enabled readers to make more strategic use of text and diagrams and to integrate information successfully from the two sources using less mental effort. However, the diagram used in the thesis will have been intermediate for the readers since they will have known the anatomy but not the surgical procedure.

## ***ii. Maps***

The second type of information graphic used in this thesis is a map. There are two types of maps: locator and explanatory (Lester, 2000, p. 162). Locator maps show a geographic location or a road system in a simplified design that lets the

reader know where something of importance has occurred. If a major news story happens anywhere in the world, a locator map might be the only visual information available until pictures can be taken at the scene. Explanatory maps not only reveal where a news story has occurred but also tell how a series of events has taken place. Readers not only learn where a news story has broken but also discover the background and time frame of events leading up to it. In this thesis, both locator and explanatory maps were used. A map showing the location of the world's largest marine reserve in Australia was used to represent the locator maps. This locator map gave an overview of the location of the marine reserve to the readers so that they can relate it to their knowledge of the area. Explanatory maps were represented by a map showing where a murderer was captured. This could help readers understand the location of the event and also explain how the murderer got caught. Journalists often provide explanatory maps in crime news and tragedy news because both types of news might attract readers' interest to know more about the news.

### ***iii. Bar graphs***

Bar graph is the third type of information graphic used in this thesis. Economic news often uses bar graphs because much of this news contains numeric information. The budget, the value of the pound sterling compared with the values of currency in other countries, the increase or decrease in criminal activity, and election results are examples of news stories that are primarily about numbers. Graphs were invented to display numerical information concisely and

comprehensibly and to show trends in the data that a reader might overlook in a verbal format (Lester, 2000). Winn (1991) explains that the use of graphs can function as a sign communicating a rising value in some measurement because human beings can use a form of mental analogy to translate the quality of the graphic mark (moving upward) into an understanding of some different quality (a rising value). In the thesis, a bar graph accompanied economic news to indicate the cash and investment of the Microsoft company.

In many ways graphs are the most interesting information graphic because they are perhaps the most varied form while, at the same time, are among the most constrained. That is, there are different types of graphs – line, bar, pictograph – and yet the way they function to communicate information is well structured (Kosslyn, 1989).

As a conclusion, it is important to remember that in online news, graphics do not appear in isolation. In fact, all parts of the page work together both to attract the reader's attention and to enhance the impression of real events taking place. In presenting news to the readers, journalists often use these three types of information graphics in order to help readers understand the information presented in the text.

## **2.4 Factors that influence news visual selections**

In presenting news to the readers, journalists make their selection from what is going on in the real world. They can apply a variety of ways for selecting from among the pool news stories they have gathered (Dimmick, 1974). Once selected, the news must be accompanied by relevant graphics for its content clarification. Journalists have to decide under the pressures of time and competition what is true, what is relevant, and what is in a sense good or bad. In other words, they must make decisions about truth and evaluations about likely reader interest.

Studies of news work have found that news selection involves more than an evaluation of stories according to their news merits. Some researchers have pointed out the role of ideology in news decision-making (Tuchman, 1978; Gitlin, 1980; Shoemaker, 1987; Soloski, 1989). Others have focused on the role of organization – its demands, limitations, and resource availabilities – in shaping what is published (Epstein, 1973; Altheide, 1976; Fishman, 1982). In addition, several studies have found that news decision-making is a group process instead of one made by individual gatekeepers (Epstein, 1973; Tuchman, 1978).

In general, there are at least four main factors that seem to influence a journalist's decision to present the news: institutional and economic factors, news values, news sources, and subjective beliefs of journalists. Among these factors,

the institutional and economic factors remain prominent in the final decision whether to publish or not to publish the news.

***i. Institutional and economic factors***

These are powerful filters that will affect news selections. Media companies are large businesses and controlled by very wealthy people or by managers, who are subject to sharp constraints by owners and other market-profit-oriented forces. They are closely interlocked, and have important common interests, with other major corporations, banks, and government (Herman & Chomsky, 1988, p. 170). Any newspaper, with a single ownership reflects the thinking of the publisher and his philosophy. To a great extent, the publisher is the newspaper and the newspaper is the publisher (Sigelman, 1973, p. 87). He has the right to expect obedience of his employees (Breed, 1955, p. 80).

Reviewing 84 studies of biased news, Bagdikian (1972) found a very high correlation between editorial policy and news bias. In only three of the 84 cases did news bias contravene editorial position. This shows that journalists' policies in selecting news are simply extensions of the political philosophies of the newspapers' publishers. The news is made, and like any other product it carries the marks of the technical and organizational structure from which it emerges. These biases are likely to continue with the publication of news stories online.



## ***ii. News values***

The selection of a news story is explained with the existence and prominence of certain features of the news (e.g., timeliness, proximity, newsworthiness, etc.). Golding & Elliott (1979, p. 118) proposed that news values were used in two ways. First, they are criteria of selection from material available to the newsroom of those items worthy of inclusion in the final product. Second, they are guidelines for the presentation of the items, suggesting what to emphasize, what to omit, and where to give priority in the preparation of the items for presentation to the audience. News values are thus working rules, which implicitly and often explain and guide newsroom practice. In general, any information without news values will not be selected for publication. Again this will remain the case for online news.

## ***iii. News sources***

The ranges of information sources which journalists use are wide and varied. These include personal contacts and electronic databases. Information may be gathered from conversations, phone-ins (where the public phones in with news or information), the daily news diary (which is used in TV and radio to record coming events - it is useful in planning the schedules) and the emergency services. A further important source is the press release, which is quickly evaluated for the news angle.

Journalists are encouraged by editorial staff to gather information by talking to people, for example, victims; officials and scientific experts. The emphasis is to concentrate on human as opposed to electronic or library-based sources of information. This is partly due to the fact that time is limited in news construction and human sources give comment or explain complex issues more succinctly and in simpler terminology than a scientific paper will.

#### ***iv. Subjective beliefs***

Studies have found that news decisions were not always based on the specific news values, but sometimes on subjective judgements (e.g., Staab, 1989; White, 1949). News is constructed and it is subjective because the media itself and the news process do not simply reproduce events that occur. Editing techniques and the selections or rejection of information which are made, preclude any sense of objectivity in news construction. However, the point to be made is that news practitioners produce the news as accurately and in as balanced a way as they can with respect to their organization's philosophy, using the information they have, from the sources they have had time to consult. This too will continue to characterize online news.

### **2.5 The influence of information graphics in news stories**

Journalist frequently incorporate human interest pictures in the text, but to visualize events, incidents, or processes, they sometimes use both information graphics and human interest pictures. The survey data reported in Chapter 1

(p.17) showed that information graphics were not often used. As a powerful journalistic tool to motivate and inform the reader, information graphics such as bar charts, tables, and maps have been found to increase retention of information (Peterson, 1983), recall (Almund, Gaffney & Kulhavy, 1985), and increase the accuracy of knowledge about a news event (Multer & Mayson, 1986; Stark & Hollander, 1990). The information graphics enable journalists to explain events and incidents, and to give the readers better and more effective information by using helpful redundancy. For instance, maps orient the reader in space. Time lines and chronologies orient the reader to events in time. A graphic can also explain a procedure or show relationships or compare commodities. In other words, information graphics can show where you are or where something happened and how.

According to Knieper (1995), there are five main subgroups of information graphics as follows:

*a) Pictograms and pictorial symbols*

Pictograms are abstract, composed, or typified pictorial symbols.

*b) Graphical adaptations*

Graphical adaptations are like a graphical frame for catchwords, listings, or any other textual parts not using numbers.

*c) Visualized elucidations*

Visualized elucidations are the information graphic that answers “how” questions: how-things-work, how-things-are-done, how-to-do-it-yourself, etc.

*d) Mass media maps*

Mass media maps are like all other maps, a commentated, exemplified, and generalized spatial information system of a county, region, country, the earth, other planets, etc. in reduced scale.

*e) Charts and quantitative diagrams*

Charts and quantitative diagrams are numerical information graphics. They depict information about numbers and their relationship.

From these subgroups of information graphics, mass media maps or mass media graphics are the types of information graphic that are often used by journalists in conveying messages to the audiences. These types of information graphic can summarize or simplify the message so that the audience can understand its meaning. They also show that different information graphics can express the same ideas in a variety of ways.

For example, the visuals below (see Figure 2.2 and Figure 2.3) show two different types of information graphic (i.e. diagrams and maps) that represent the news about Tsunami in order to give the readers an overview of how and where the Tsunami happened. Although they are in different graphic forms they represent similar issues about Tsunami in a simple and easy way to understand.

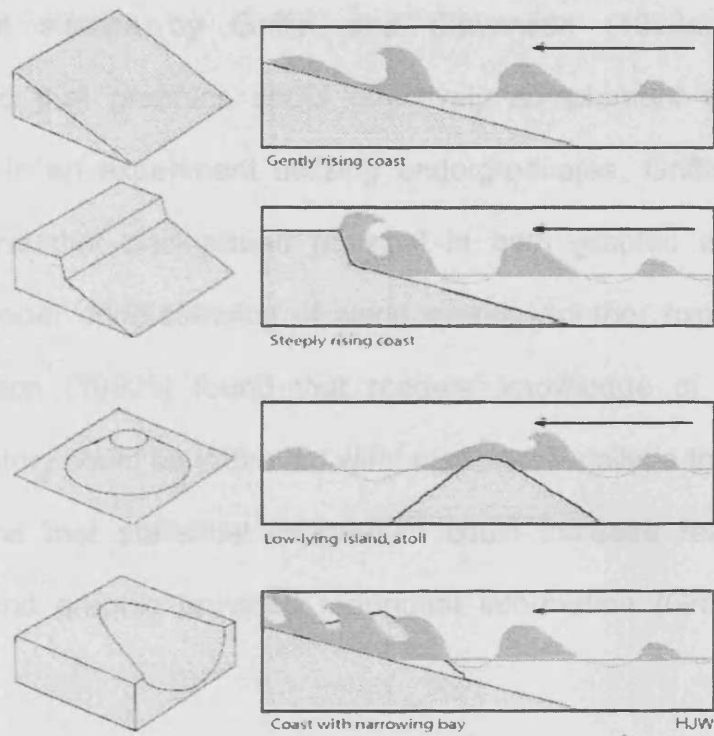


Figure 2.2 Example of diagrams in the Tsunami news



Figure 2.3 Example of maps in the Tsunami news

A series of studies by Griffin and Stevenson (1992a, 1992b, 1992c) demonstrated that graphics could effectively complement text in conveying information. In an experiment utilizing undergraduates, Griffin and Stevenson (1992a) found that background material in both graphic and textual forms increased reader understanding of world events. Another experiment by Griffin and Stevenson (1992b) found that readers' knowledge of the geographical setting of a story could be improved with a graphic. Finally, a third study by these authors found that statistical information could increase readers' knowledge when text and graphic provided redundant information (Griffin & Stevenson, 1992c).

Further experimental support for the idea that information graphics can effectively help to tell a story came from Stark and Hollander (1990) who concluded that a 'How' graphic enhanced readers' accurate recall of the facts of a printed news story. In their experimental study, participants received one of four versions of a simulated front page whose lead story about a plane crash was offered in one of four ways: without visuals, with a 'How' graphic, with an aftermath photo, or with both the 'How' graphic and photo. The graphic did not contain information that was unavailable in the text. Responses to a questionnaire about the crash showed that readers having more visuals were able to answer more questions and to answer more accurately. The ability to answer accurately was highest for the group with the story plus 'How' graphic plus photo, followed by the group with

the story plus 'How' graphic, the group with story plus photo, and the group with story only.

An experiment using bar charts found that sidebar stories were more effective than graphics at aiding reader recall. To test his hypotheses, Ward (1992) showed groups of students either a story alone, the story accompanied by a related bar chart, the story and bar chart with shading and artwork, or the story and a sidebar story containing the same information found in the graphs. He found that the fewest recall errors occurred in the group that had seen the story and sidebar story.

Based on his findings, Ward recommended that journalists keep their graphics simple. He suggested a complicated graphic will lead readers to ignore the story. He also suggested adding a small block of text within graphics telling the readers what to look for. He admitted, though, that his results cannot be generalized to apply to every situation. Factors such as reader interest level in a particular subject and reader demographics may make a difference.

The above findings show that information graphics have been used in the study of the retention of news stories. However, the relative effectiveness of human interest pictures and information graphics has not been investigated. It is possible they may both be effective but through different processes. Human interest pictures might increase the reader's motivation, and hence retention,

whereas information graphics might aid readers' understanding and hence retention. Retention is also the focus of researchers in educational and psychological studies. Further explanation on how information graphics produce an effect on retention will be discussed in the following chapter.



## CHAPTER THREE

### GRAPHICS: AN EDUCATIONAL PSYCHOLOGIST PERSPECTIVE

#### 3.0 Introduction

As described in Chapter 2, journalists used information graphics to explain events and incidents, and to give the readers better and more effective information. However, the incorporation of information graphics in the news stories depends on the events being reported. This indicates that although information graphics were incorporated in news stories their usage was limited to certain events, such as in tragedy news like tsunami where the use of information graphics seems necessary to give further explanation to the readers about how and where the tragedy happened.

In contrast, the use of graphics in multimedia learning has increasingly become the subject of thorough investigation in domains such as education and psychology. Researchers in both disciplines were concerned with learning from combinations of texts and graphics in multimedia presentations because it has been shown that graphics combined with texts can produce strong facilitative effects on learning and retention. Text information is better remembered when it is illustrated by graphics than when there is no illustration (Levie & Lentz, 1982; Levin, Anglin & Carney, 1987).

It would be fair to say that previous researchers in education and psychology have been concerned with one type of graphic, i.e., information graphic that can influence learning and retention.

### **3.1 The functions of information graphics**

Graphics that attempt to make the text more coherent or comprehensible can be categorized as serving an organization, interpretation, or transformation function (Levin, Anglin & Carney, 1987). Graphics that seek to accomplish these high level cognitive functions, such as facilitation of comprehension, spatial organization, or inference making, are known as information graphics. These can be anything from a pleasing arrangement of facts and figures in a table to a complex, interactive diagram with accompanying text that helps explain a complex story's meaning. With headlines, text, photographs, video and audio, information graphics are included in media presentations in order to explain aspects of a story that words alone could not explain fully (Levin, Anglin & Carney, 1987).

According to Green, Reinitz, Johnson, Shigley (2001), the visual presentation of information can be simple or complex (i.e. ranging from single-dimensional diagrams to multi-dimensional contour maps) because all information graphics share one common goal: to convert "bare" numbers or facts into a readily understandable picture. According to Green et. al., the information graphics, therefore, can be used to: (1) emphasize the essential relationships among the

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data, (2) highlight which data out of a larger group might be more important, (3) condense many separate data values into a single informational space and (4) provide another representational format (i.e., pictorial rather than verbal) to help readers understand a set of data.

To evaluate whether graphics are beneficial to processing of text, it is necessary to settle on the desired learning outcome. Learning outcomes can be classified under different categories, such as recall or retention, comprehension, problem solving, inference making, and skill acquisition. Among these cognitive variables, one of the standard findings is the gain in recall or retention produced by the addition of relevant pictures to text (Levin, Anglin & Carney, 1987).

### **3.2 The factors that determine what people learn from text**

Since learning from text is a central concern in educational psychology, it is useful to define what learning means. According to Kozma (1994) learning can be defined as an active, constructive, cognitive, and social process in which the learner strategically manages available cognitive, physical, and social resources to create new knowledge by interacting with information in the environment and integrating it with information stored in memory. This indicates that knowledge and learning are the result of an interaction between the learner's cognitive resources and aspects of the external environment. Moreover, this interaction is strongly influenced by the extent to which internal and external resources fit together.

Similarly, Seel & Strittmatter (1989) defined learning as an alteration of knowledge that can be interpreted as a consequence of changing or transforming the state of existing knowledge. This means that knowledge gain and learning can only exist when learners have integrated the incoming information with their existing knowledge and transformed it into new knowledge.

Eveland (2002) suggested that there were at least three factors determining what people learn from text. First, the individual must develop a goal to learn the information from the text. Setting a goal from exposure to information in a text can be seen as a factor that motivates readers to process the information. This factor is one of the individual differences between readers that determines their level of attention, motivation and ability to recall what they read, hear or see (Tichenor, Donohue & Olien, 1970; Robinson, 1967).

Second, the individual must consciously attend to the information in the text, and third, the individual must elaborate on the information by processing it deeply, thinking about it, and making connections between it and information or past experiences that are already stored in memory. This means that readers need to actively interact with the information in order to understand the text. This factor will determine how well readers remember particular stories, i.e., the distinctive cognitive processing requirements of visual, audio and audiovisual formats provided by print and broadcast media (Gunter, 1987; Robinson & Levy, 1986). This suggestion supported Lowe's (1993) notion that the process of reading text

involves readers in putting together the information presented on the page (external) with the internal knowledge they already possess inside their heads. The integration between internal and external knowledge can produce learning and help readers to remember the text.

### **3.3 The effects of information graphics on learning and retention**

There is a growing research literature showing that students learn more deeply from well-designed multimedia presentations (combinations of words and pictures) than from traditional text-only messages, including improved performance on tests of problem-solving and transfer (Mandl & Levin, 1989; Sweller, 1999; Mayer, 2003; Lowe, 2003; Lewalter, 2003; Schnotz & Barnett, 2003).

One of the major contributors in multimedia learning with combination of texts and graphics has been Mayer, most of whose studies deal with the effects that picture in text have on problem-solving skills. Mayer (2003) focused on multimedia presentations that contained spoken or written words combined with illustrations or animations that were designed to foster meaningful learning. Since the text used in his study was on how a pump works, Mayer defined learning as new knowledge that leads to problem-solving transfer. In his study context, he assumed that someone who understands how pumps work would be able to troubleshoot a malfunctioning pump by generating possible reasons for why it did not work or explain how to redesign a pump to meet a new purpose. Practical

implications of Mayer's work were that multimedia instructions should present words and pictures rather than words alone, but should exclude extraneous words and pictures. Furthermore, corresponding words and pictures should be presented near each other, and the verbal component should use a conversational style.

Lewalter (2003) also questioned the widespread assumption that animations result in better learning than static pictures and investigated the differences in cognitive processes associated with learning from animated and static illustrations. She referred to static and dynamic graphics as "simple media" that do not confront the learner with problems in processing the presented information. Sixty undergraduate students were randomly assigned to three groups of 20 persons each corresponding to three experimental conditions (text with static illustration, text with animated illustration, and text only). The text dealt with the external appearance and the explanation of optical phenomena as a result of optical gravitational lensing and was identical in all three versions. In the version with dynamic visuals, the learning text was illustrated by animated graphics, which showed the course of motion completely. In the version with static visuals, motion was symbolized by a single frame or a series of frames (two to four frames) depicting the steps, showing the positions of stars and the change of their external appearance, or by arrows symbolizing the development of the light ray. The text and the illustrations were presented on separate pages, starting with the text passage, which explained what would be seen in the

immediately following illustrations. To maintain the alternation of text and illustration, the text-only version included content-free pictures showing circles and lines. The findings showed that both illustrations, the static and the animated illustration, had the same effects on comprehension and problem solving. The data indicated a lack of superiority of animations on learning outcome when compared with static visuals. It is possible that the potentially supportive effects of animations may have been lost because individuals had less control of their processing in learning from animations and thus had restricted opportunities to use appropriate learning strategies.

In a similar vein, Schnotz & Barnett (2003) revealed that adding pictures to a text was not always beneficial, but could also have detrimental effects on the task-appropriate mental representations. They examined diagrams in two different forms (i.e., carpet and circle) that influenced the mental model structure in two different tasks: time difference and circumnavigation. The two diagrams illustrated the fact that there exist on earth different daytimes and dates at the same time. The carpet diagram showed the earth as a rectangle moving across a time axis like a kind of flying carpet. In this diagram, the left-right dimension was used to represent earlier-later relations in time. The circle diagram showed the earth as a circle (or sphere) seen from the North Pole, which rotated in a bowl of different daytimes and dates. In this diagram, counter-clockwise rotation was used to represent earlier-later relations in time.

The researchers also examined whether adding a picture to a text supported or interfered with text comprehension. Sixty university students were randomly assigned to three groups of 20 persons each corresponding to three experimental conditions (text with carpet diagrams, text with circle diagrams, and text only). The three experimental groups were homogenous with regard to prior knowledge, verbal ability, and spatial ability. Texts in the three experimental treatments were informationally equivalent except for some differences in wording, which were necessary in order to refer to the different diagrams. The diagrams were presented together with the corresponding text paragraphs. Two different kinds of tasks were used: time difference tasks and circumnavigation tasks. In the time difference tasks, the learner was asked to find time differences between specific cities, as for example in "What time and day is it in Los Angeles when it is Tuesday 2 o'clock p.m. in Tokyo?". In the circumnavigation tasks the learner has to travel mentally around the world as, for example, in "Why did sailors believe that they arrived on a Wednesday after sailing around the world, although it was already Thursday?" Both kinds of questions can be answered with both forms of visualizations. On the time difference task the best performance was shown by the text-only group, closely followed by the carpet group, and the poorest performance was in the circle group. With regard to the circumnavigation task, on the contrary, the circle group showed the highest performance, followed by the text-only group and the lowest performance was in the carpet group. Schnotz and Barnett suggested that pictures facilitated learning only if the subject matter was visualized in a task-appropriate way.



Sweller and his colleagues demonstrated in a series of experiments that physical integration of verbal and visual information influenced how learners split their attention between text and picture. The verbal and visual integration lead to better learning (Chandler & Sweller, 1991; Sweller, Chandler, Tierney & Cooper, 1990). In normal reading of news stories that have pictures, of course the readers have to split their attention between text and pictures but a problem may arise in where to resume reading after looking at the pictures. This may interrupt and annoy the reader but also, and more important, it may distract the reader from thinking about the message of the text (Sweller, Chandler, Tierney, & Cooper, 1990).

The above discussion showed that educational psychologists used one category of picture, i.e., information graphics and suggested that the combinations of words and pictures would increase retention and enhanced learning.

### **3.4 Cognitive theory of multimedia learning**

Because it provides a theoretical explanation for the gain in retention that results from the addition of pictures to text, the cognitive theory of multimedia learning proposed by Mayer (1997) has some relevance to this study. This theory gives an explanation of the conditions in which readers will profit more from multimedia messages than from verbal-only messages. This theory is based on three assumptions: the active learning assumption, the dual coding assumption, and the limited capacity assumption.



**Figure 3.1** A framework for a cognitive theory of multimedia learning  
(Source: Mayer, 1997)

### 3.4.1 The active learning assumption

According to the first assumption in this theory, meaningful learning requires the reader engage in active cognitive processing. Active processing in requires that the reader pays attention to relevant words and pictures, organ the corresponding information into coherent verbal and pictorial me representations, and finally integrates verbal and pictorial representations each other and with prior knowledge. Cognitive processing takes place in b visual channel and a verbal channel, each of which has a very limited capacit

The theory presented by Mayer predicts that readers learn more deeply i words and pictures than from words alone (multimedia effect), that readers l more deeply when extraneous material is excluded rather than inclu (coherence effect), and that they learn more deeply when printed words placed near rather than far from corresponding pictures (spatial contiguity eff

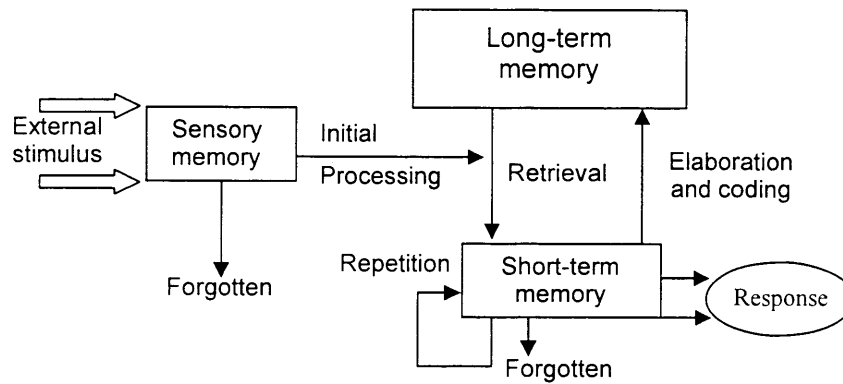
Furthermore, this theory assumes that readers learn more deeply when words are presented in conversational rather than formal style (personalization effect).

### **3.4.2 The dual coding assumption**

The second assumption in this theory is the dual coding assumption. In an effort to explain the advantage for pictures when combined with words, Paivio (1971, 1986) advanced a dual-coding framework, which is based on the premise that visual and verbal attributes of stimuli are represented in two independent and interconnected subsystems in memory, one specialized for sensory images and the other specialized for verbal language. Extending dual coding theory to text stimuli leads to the prediction that a text presented with a relevant picture would stand a better chance of dual coding and hence better retention than would text without a picture.

### **3.4.3 The limited capacity assumption**

The third assumption in Mayer's theory is from the limited capacity assumption. The information processing approach focuses on how the human memory system acquires, transforms, compacts, elaborates, encodes, retrieves, and uses information (Moore, Burton, & Myers, 1996). The memory system is divided into three main storage structures: sensory memory, short-term memory, and long-term memory (as described in Figure 3.2).



**Figure 3.2** Model of information processing  
(Source: *Baddeley, 1992*)

The sensory memory deals with the encoding of information into memory. Encoding is the process by which learners are able to gather and represent information. It is the first step in information processing. In order to move the information into consciousness, the learner needs to attend to it. Attention is the process whereby some incoming stimuli are selected for more complete processing. An attended information inputs receives more processing than unattended inputs and is remembered better (Lachman, Lachman & Butterfield, 1979). Attention, as conscious processing, is a precursor to memory. Therefore, if pictures attract attention (as the journalists suggest), it is not surprising that past research has shown that pictures can improve memory.

Although it is true that memory storage can take place automatically, direct recall of stored material is possible only with the presence of attention both at the time of encoding and at the time of recall. Controlled attention allows for a more

complete encoding of a stimuli, and thus, better memory (Cowan, 1995; Fisk & Schneider, 1984).

The second step in information processing involves retention or holding the information in the short-term memory or working memory. In order to achieve retention, learners have to understand the information. Understanding involves an interaction between new information that is being received and information or knowledge that has already been stored.

The last procedures in information processing are long-term memory operations that deal with the retrieval of information. Long-term memory is a complex and permanent storage for individuals' knowledge about the world and their experiences in it. Long-term memory contains large quantities of information that have to be organized efficiently so they can be rapidly retrieved.

In summary, these three assumptions provide a theoretical framework for the current research in investigating retention through the combined processing of verbal and pictorial information. The present study focused on the processing of the pictorial information and expanded Mayer's theory by investigating the effects of different picture categories on retention. Two different picture categories were used, i.e., human interest and information graphic, and it was predicted that news stories with information graphics were processed differently from news with human interest pictures, in terms of the attentional and memory processes

recruited. The implication of readers' working memory limitations will not be explicitly considered in this thesis.

### **3.5 Conclusion**

Prior work from two academic disciplines, journalism and educational psychology, gives an overview of the role of pictures in access and retention. What is clear from the literature in Chapter 2 is that there has been little effort made to discuss what it is about pictures that is producing effects on access. Certainly, many researchers have worked to clarify which pictures influenced access (e.g., Sargent, 2005; Knobloch, Hastall, Zillmann & Callison, 2003; Zillmann, Knobloch & Yu, 2001; Zillmann & Bryant, 1985), but typically their research has focused on the emotional elements within the picture. For instance, the literature showed that the access to the news stories was heightened by negative or threatening elements contained in the picture. In contrast, it is unclear how neutral human interest pictures influence readers to access news stories. Is the access process influenced by less emotive pictures? Indeed do the pictures have to be human interest? The research on information graphics reported in Chapter 3 looked at retention. The issue of influence on access seems not to have been explored. This is one of the questions, which will be addressed in the following studies.

The literature in Chapter 3 showed that information graphics increased reading time and enhanced retention. However, educational materials are very different

from news stories. Indeed news stories are not a homogeneous category and the type of information graphics accompanying hard news, such as crime, may differ in the emotional engagement of the reader when compared with soft news such as science, where the graphics may be more technical. If so, these information graphics may have differing effects on retention. This is another of the questions that will be explored in the following research.

Another factor that has not been examined is whether human interest pictures might have similar effects on retention as information graphics, albeit for different reasons. Given that human interest pictures influence access, this could indicate increased reader motivation, which in turn might lead to better retention of the news story. So the relative effectiveness of human interest pictures for enhancing retention, compared to information graphics, will be another of the questions addressed in the following studies.

In summary, the focus of the research reported here will be on the relative influence of human interest and information graphics on both access and retention, for both hard and soft news stories where this influence is assessed against a base line of news stories without pictures.

## **CHAPTER FOUR**

### **METHODOLOGY**

#### **4.0 Choice of research method**

This chapter outlines the rationale for the choice of research method adopted in the thesis, and summarizes those elements that were common to all the studies. Researchers in mass media studies have a number of research designs when analysing phenomena that occur in society. They can choose from an experiment, survey or case study, but different phenomena need different methodologies to investigate their effects on society. Surveys and experiments are frequently combined with questionnaires, and case studies are often combined with participant observation (deVaus, 2001, p. 9). This means that every research design can use questionnaire, interview, observation or document analysis as a method of collecting data.

However, in investigating cause and effect phenomena, experiment is the best method to apply. According to Gunter (2000, p. 212), causation is best explored through experimental methodologies in which the amount and nature of media exposure is systematically controlled by the research, and specific effects are measured as a direct reaction to the form or content to which respondents have been exposed.



The laboratory experiment has been used in mass media research to investigate the way people use media and to study media effects upon their audiences. However, media effects research has been criticised as being too general and focusing on mass media impact (McGuire, 1986). Such concern has typically focused on issues related to violence, political behaviour, consumption, opinion leaders, AIDS, and so on. The evidence accumulated to date has provided little indication of media effects on viewers' thought, feelings, or actions.

The other criticism of media effects research is that it has lacked any focus on explanatory mechanisms. That is, media effects research has been primarily concerned with relations between input variables (e.g., media information and its characteristics) and output variables (e.g., attitudes, beliefs, and behaviour), with little consideration of the cognitive processes that might mediate these relations (Hawkins & Pingree, 1990). For example, one approach to media effects can be seen in the work of Gerbner and Gross (1976a) and their "media cultivation" theory. Their central concern is media violence and society, that is, to show how far television cultivates viewers' perception of society. They emphasize the effects of television viewing on the attitudes rather than the behaviour of viewers. Heavy watching of television is seen as 'cultivating' attitudes which are more consistent with the world of television programmes than with the everyday world. Watching television may tend to induce a general mindset about violence in the world, quite apart from any effects it might have in inducing violent behaviour. Cultivation research, as exemplified by Gerbner and Gross, looks at the mass media as a

socializing agent and investigates whether television viewers come to believe the television version of reality the more they watch it.

In contrast, Hawkins & Pingree (1990) suggests that social cognition research can explain media effects to the extent that the researchers are confident what they are observing is a true causal effect and not one that is spurious. In relation to the present study, a social cognition research paradigm will be adopted in order to investigate the effects of pictures. This study used a controlled laboratory experiment, a setting where the relation between pictures and text can be systematically manipulated.

However, there are several disadvantages of using the laboratory approach. First, unlike normal reading environments where people can select the news to read, people in laboratory settings may be reading materials they might otherwise ignore. This means that there is no option whether to read or not to read the materials in laboratory setting. Once involved in the study, participants have to follow the procedures specified in the experiments. Second, given the fact that everything must be under control in a laboratory setting, the sample of participants will be small and therefore, unrepresentative of the readership in general. Although the laboratory setting does not represent a realistic reading condition, it does allow control and measurement of the effects of graphics on access, retention, reading time and assessment of the overall design.

The following experiments were conducted to investigate how pictures might influence readers in accessing and remembering online news stories. They compared news that was accompanied with a human interest picture to the same news story accompanied by an information graphic and the same news story without any graphics. Participants were randomly assigned to various versions of text and graphic manipulation, and systematic comparisons were made among the outcomes (probability of access, amount of retention and subjective evaluations of the news story).

#### **4.1 Experimental design**

All three studies used a mixed factorial design that included both between and within participant variables. According to Harris (1998) it is possible to see any interactions among the dependent variables being investigated by using a factorial design. Participants were randomly assigned to one of three groups that received either the news story only, the story with a human interest picture or the story with an information graphic. In applying the mixed factorial design, each participant was exposed to all four news stories: two stories were accompanied with human interest pictures and two stories with information graphics. The two independent variables were picture category and news story. Picture category was manipulated with three levels: human interest picture, information graphic and no picture (text only) while news story was manipulated with two levels: soft news and hard news. The dependent variables were access, retention, reading time and assessment of overall design of the online news story.

Access and reading time were measured during the experiment while retention and assessment of overall design were measured after participants had finished reading all the stories. They had to answer a set of 16 multiple-choice questions per story.

## **4.2 Participants**

Studies on pictures and indeed many other media effects have used students as experimental participants. Sears (1986, p. 517) suggested that the use of “college sophomores” as participants in experiments provides a narrow database even though those studies provide valuable insights. This concern is especially pertinent to a field such as mass communication, where the ultimate product is intended for a diverse readership. However, for the sake of this study which is concerned with the effect of pictures on readers’ access and retention of news stories, the use of students as participants would seem appropriate because they are experienced readers who are accomplished in decoding a text and in interpreting various types of pictures.

Additionally, students would be the new intended readership that newspaper companies had hoped would support online editions and advertisers. The implications of students, media-use habits are significant for the newspaper industry in the future. With this baseline of college students’ use of Internet and online newspapers, there is a place to start from which to gain a better understanding of how pictures might influence their information seeking.

### 4.3 Stimulus materials

The materials used in the experiments were two examples each of two different types of pictures which were paired with four different news stories. The two types of pictures were “human interest” and “information graphic”. The human interest pictures represented some elements from the text and showed what something or someone treated in the text looked like. So the human interest pictures served a representative function that attempted to capture the actors, objects, and events presented in the text (Levin et. al., 1987). This type of picture might capture readers’ attention and interest before they got to the first paragraph of the story.

As was discussed in Chapter 3, pictures that attempt to facilitate comprehension, spatial organization, or inference making, are known as information graphics. It refers to visual displays from a pleasing arrangement of facts and figures in a table to a complex, interactive diagram with accompanying text that helps explain a complex story’s meaning. The information graphics were included in the media messages in order to explain aspects of a story that could not be fully explained by words and to foster reader’s understanding and retention of the story.

There were four different types of news stories used in this study: health, science or nature, crime and economics. The health, science, and crime news articles were retrieved on 27 July 2004, while the economics article was retrieved on 23 July 2004. The health story described a new innovation for correcting hernia while a baby was still in the womb; the science story

described the biggest marine reserve located in Australia; the crime story revealed how a murderer who killed twins sisters was captured; and the economics story dealt with dividends paid by Microsoft to its share holders. The stories varied in word length from 480 to 990 words and had an average reading time between three to five minutes each.

According to the Flesch Readability Index, which measures ease of reading, the four news stories fell into the 50 to 70 point range which corresponds to the reading level achieved by 11 and 12 years old (school year 6 and 7). The crime story scored 70.1 on a 100-point scale of readability – slightly easier than the other three news stories. The science/nature story came next with 62.9, third was the economics story at 60.8 and finally, the health story at 56.0.

#### **4.3.1 Reasons for choosing news stories**

There were four reasons for selecting the news articles for this study. First, the news stories were all provided online and met the two categorizations of news, i.e. soft news and hard news as described in Chapter 1. In this study, crime and economics were examples of hard news, while health and science/nature fell into soft news category.

Second, each news story originally contained both a human interest picture and an information graphic. The human interest pictures showed photographs of people that related to the story, while the information graphics were of three types: diagrams, maps, and bar graph. This range of graphic representations

was important because pictures are not homogenous and different kinds of information graphics may have different effects on both access and memory. The health story had a photo of sleeping babies as the human interest picture and a biological diagram showing the operation procedure as the information graphic (see Appendix H). In the science/nature story, the human interest picture showed a photo of the elephant seals landing on the seashore, while the information graphic showed the location map of the world's biggest marine reserve (see Appendix I). The crime story showed a photo of the twin sisters who were killed as the human interest picture, while a map showing where the murderer was captured was the information graphic (see Appendix J). The economics story used a photo of Bill Gates as the human interest picture and a bar graph to indicate the cash and investment of the company as the information graphic (see Appendix K).

The third reason for choosing these news articles was because they represented the varieties of news that commonly appear in an online newspaper. In a week's sample from six online newspapers starting from 10-16 September 2004, there were eight categories of news that appeared almost everyday: politics, economics, education, crime, health, entertainment, sport and science. By using four different types of news, it would be possible to explore how the two categories of pictures influenced readers in accessing and remembering news stories.

The fourth reason these news stories were chosen was because they were novel in terms of "newsworthiness". For example, newsworthiness can be

seen in the crime story where the suspect was captured after he had murdered twins, in which one of them was also his girlfriend. It is important to use unfamiliar topics in order to be able to assess how much is learned from reading the news stories. Novel news may cause people to process the story more or perhaps people will spend more time with it. It would seem logical if someone is more curious about the story, they would become more interested in the story, and then perhaps learn more from the story. This means that people were able to judge news on their novelty, and this novelty could affect attention and memory.

#### **4.3.2 Display screen as news front page**

A simple display screen that imitated a news front page was created for the stories using pictures and headlines. The four news stories were chosen from different websites as follows and were presented unaltered apart from the accompanying pictures.

- a. Health – “Deadly hernia corrected in womb” (538 words)

[\(<http://news.bbc.co.uk/1/hi/health/3926449.stm>\)](http://news.bbc.co.uk/1/hi/health/3926449.stm)

- b. Nature – “Australia to create biggest marine reserve” (487 words)

[\(<http://news.bbc.co.uk/1/hi/world/asia-pacific/2313881.stm>\)](http://news.bbc.co.uk/1/hi/world/asia-pacific/2313881.stm)

- c. Crime – “Murders suspect stays in hospital “ (505 words)

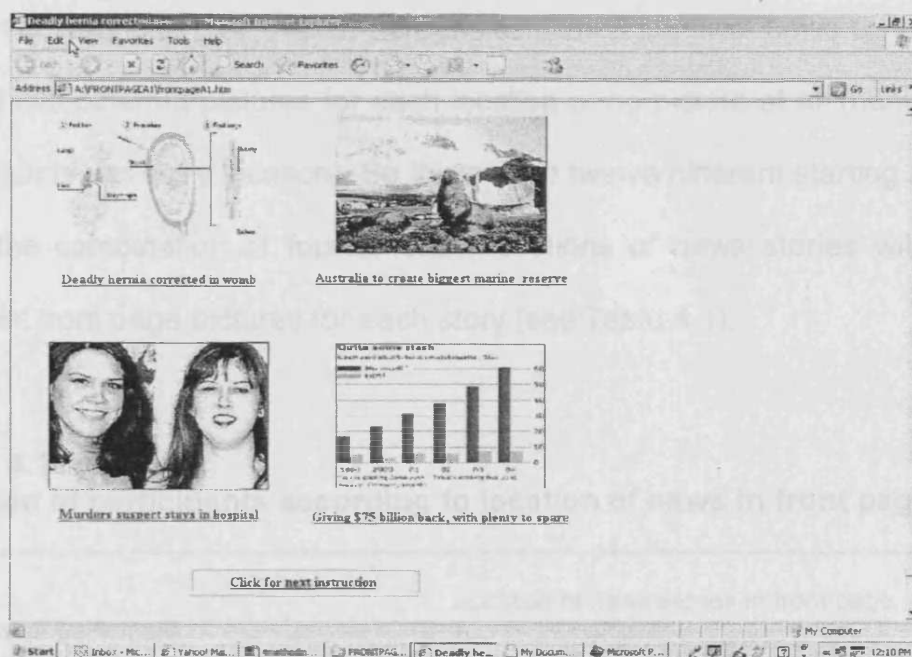
[\(\[http://news.bbc.co.uk/1/hi/england/north\\\_yorkshire/3925435.stm\]\(http://news.bbc.co.uk/1/hi/england/north\_yorkshire/3925435.stm\)\)](http://news.bbc.co.uk/1/hi/england/north_yorkshire/3925435.stm)

- d. Economics – “Giving \$75 billion back, with plenty to spare” (989 words)

[\(\[http://www.economist.com/agenda/displayStory.cfm?story\\\_id=2940879\]\(http://www.economist.com/agenda/displayStory.cfm?story\_id=2940879\)\)](http://www.economist.com/agenda/displayStory.cfm?story_id=2940879).



Each participant was given an online display screen in which the screen was divided into quadrants each of which contained a picture relating to a different news story (see Figure 4.1 below). The screen was purposely divided into four quadrants in order to examine the effects of types of picture on access while controlling for the picture's location on the screen.



**Figure 4.1** The four quadrants of news stories in a display screen

Across all four quadrants there was a mixture of human interest pictures and information graphics. The pictures were lifted straight from the online newspaper in order to make the display screen look very much like a copy of the original online newspaper. The stories were assembled using Microsoft FrontPage to imitate, as closely as possible, the online newspaper style. Each story ran with the same headline and subheadings as its original.

In order to counterbalance picture category across story content, a *Latin Square* design was used. According to Field and Hole (2003) *Latin Square* design is a way to deal with the problem of confounding effects in within-subject designs. In this design, the spatial position on the screen in which various stories appeared was counterbalanced, so that each possible combination of story and picture type occurred in each spatial position on the screen equally often. All display screens contained identical news content with one of two different pictures for each location or no picture at all (hence three participants per story location). So there were twelve different starting screens from the combination of four different locations of news stories with three different front page pictures for each story (see Table 4.1).

**Table 4.1**  
**Position of participants according to location of news in front page**

Successive participant	Location of news stories in front page			
	Top Left	Top Right	Bottom Left	Bottom Right
Participant 1 in groups 1, 2, 3	Health	Science	Crime	Economics
Participant 2 in groups 1, 2, 3	Science	Economics	Health	Crime
Participant 3 in groups 1, 2, 3	Economics	Crime	Science	Health
Participant 4 in groups 1, 2, 3	Crime	Health	Economics	Science

On each display screen, clockwise from the top left a human interest picture alternated with an information graphic. Participants in Group 1 saw a display screen with an information graphic in the top left and participants in Group 2 saw a display screen with a human interest picture in the top left. Participants

in Group 3 saw all display screens without any picture. Similar group allocations were applied as the stories were rotated around the display screen (as shown in Figure 4.2).

**ABCD order**

Group 1		Group 2		Group 3	
A Health news with information graphic	B Science news with human interest picture	A Health news with human interest picture	B Science news with information graphic	A Health news	B Science news
C Crime news with human interest picture	D Economics news with information graphic	C Crime news with information graphic	D Economics news with human interest picture	C Crime news	D Economics news

**BDAC order**

Group 1		Group 2		Group 3	
B Science news with human interest picture	D Economics news with information graphic	B Science news with information graphic	D Economics news with human interest picture	B Science news	D Economics news
A Health news with information graphic	C Crime news with human interest picture	A Health news with human interest picture	C Crime news with information graphic	A Health news	C Crime news

**DCBA order**

Group 1		Group 2		Group 3	
D Economics news with information graphic	C Crime news with human interest picture	D Economics news with information graphic	C Crime news with human interest picture	D Economics news	C Crime news
B Science news with human interest picture	A Health news with information graphic	B Science news with human interest picture	A Health news with information graphic	B Science news	A Health news

**CADB order**

Group 1		Group 2		Group 3	
C Crime news with human interest picture	A Health news with information graphic	C Crime news with human interest picture	A Health news with information graphic	C Crime news	A Health news
D Economics news with information graphic	B Science news with human interest picture	D Economics news with information graphic	B Science news with human interest picture	D Economics news	B Science news

**Figure 4.2** Display screen for Group 1, 2 and 3 in four orders of news stories

For example, in display screen with ABCD order, participants in Group 1 had a display screen that contained health news with an information graphic, science/nature news with a human interest picture, crime news with a human interest picture, and economics news with an information graphic (see Figure 4.1).

Corresponding participants in Group 2 had a display screen that contained health news with a human interest picture, science/nature news with an information graphic, crime news with an information graphic, and economics news with a human interest picture (see Figure 4.3).



**Figure 4.3** An example of display screen for Group 2 in ABCD order

The corresponding participants in Group 3 had a display screen that contained the headlines only (see Figure 4.4).

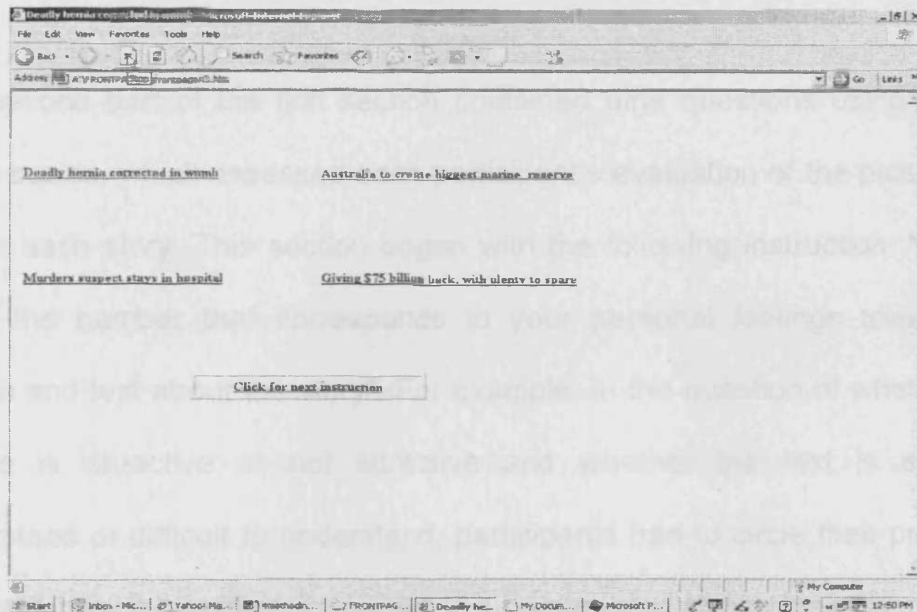


Figure 4.4 An example of display screen for Group 3 in ABCD order

#### 4.4 Instruments and measures

Immediately after reading all the stories, readers were asked to complete a questionnaire which was divided into three sections: (a) retention and assessments of the picture and text in each story; (b) assessments of overall design and preferences; (c) demographic (see Appendix A). The first section was divided into two parts. The first part contained seven multiple-choice questions assessing retention. Each question contained five choices of answer which included "didn't read that part" if they felt that they had not come across the information while reading. The retention test contained the following instructions at the top of the sheet: "Please circle the letter in front of

your answer". The retention score was computed for each participant by counting the number of correct answers that the participant produced on the retention test (max=7 in each story).

The second part of the first section contained nine questions using 5-point rating scales, which assessed each participant's evaluation of the picture and text in each story. This section began with the following instruction: "Please circle the number that corresponds to your personal feelings toward the picture and text about the story". For example, in the question of whether the picture is attractive or not attractive and whether the text is easy to understand or difficult to understand, participants had to circle their preferred answer for each question. Points 5 and 4 represented strong feelings, points 2 and 1 represented fairly weak feelings, point 3 on the scale showed undecided or neutral feelings (see Appendix A).

In the second section of the questionnaire, participants recorded their assessments of overall design and preferences for the news stories. This section began with the following instruction: "Please circle the number that corresponds to your personal feelings toward the overall design of the news stories that you have read". Participants were asked to record their level of agreement with each of six questions, e.g. "I like newspaper articles that have pictures", using a 5-point scale ranging from 5 (strongly agree) to 1 (strongly disagree).

The third section contained 13 demographic questions that recorded the participants' background such as their web experience, their comfort while reading on the screen and familiarity with using links, their age and gender.

#### **4.5 Procedure**

The procedures used in Experiments 1, 2 and 3 are summarized as follows but the detailed variations will be described as each experiment is reported.

- a. Participants were invited through email to attend an experiment session to assess online newspaper articles.
- b. As the participants came into the lab for the experiment, they were systematically assigned to Group 1, Group 2 or Group 3. The experiment was administered on a first come, first served basis. Participants were assigned in the order in which they arrived as follows: The first three participants to enter the lab belonged to Group 1, 2 or 3 having ABCD display order (see Table 4.1); the fourth to sixth participants belonged to Group 1, 2 or 3 in the BDAC order; the seventh to ninth participants belonged to Group 1, 2 or 3 in DCBA order, and the tenth to twelfth participants belonged to Group 1, 2 or 3 in CADB order. This allocation pattern was repeated for the remaining three sets of 12 participants.
- c. After sitting down in front of the monitor, every participant was asked to sign a consent form and then read the instructions explaining how to access the news stories.
- d. Participants were asked to raise their hands when they were finished reading all the news stories. They then received the questionnaire.



e. After completing the questionnaire, the researcher gave the participant a debriefing note (see Appendix C) and thanked them for participating. The researcher also urged the participants not to share any information about the experiment with their peers who possibly would be attending subsequent sessions.

## CHAPTER FIVE

### EXPERIMENT 1: THE EFFECTS OF PICTURES ON THE RETENTION OF ONLINE NEWS STORIES

#### 5.0 Introduction

Experiment 1 was designed to compare the effects of human interest pictures and information graphics on two different categories of news stories, hard news and soft news. These effects were assessed against a baseline of news stories without graphics. The comparisons focused on willingness to access a story, retention of the story together with time spent reading it, and overall impression of the design features of the story.

The willingness to access a story was assessed in two ways. Participants gave hypothetical responses when first shown the four options. The reason for this was to get a measure of access that would not confound subsequent retention measures. Studies have shown recall increased for items appearing in the first and last positions (Berry, 1983; Wicks, 1992). These first and last positions have therefore become known as the “favoured positions” and should be monitored as potentially confounding variables in measuring viewer recall. However, the hypothetical access data was supplemented during each participant's later evaluation of design features by subjective ratings. It was expected from the literature reviewed in Chapter 2 that access would be influenced by human interest pictures, but the question of interest was

whether human interest pictures would be more effective than information graphics.

The research focus in relation to retention and reading times was two-fold. From the literature reviewed in Chapter 3, it was expected that information graphics would give rise to longer reading times and better retention. The question of interest was whether human interest pictures might have similar effects.

With respect to the evaluation of the impact of the overall design, the research question concerned whether the two graphics categories had similar or different effects.

## **5.1 Experimental design**

As explained in Chapter 4, this experiment was a mixed factorial design. There were four display orders of the stories and within each order participants were randomly assigned to one of the three experimental groups. Participants in Group 1 and Group 2 received a combination of two human interest pictures and two information graphics. Participants in Group 3 had news stories in the same four display orders but without pictures. Before starting to read, participants recorded their preferred order of reading the stories. However, the researcher controlled the actual order of access in order to counterbalance across participants the order of stories being read first and read last. During reading participants recorded their own start and finishing

times for each news story, and after reading they completed the questionnaire described in Chapter 4.

## **5.2 Participants**

There were 48 students from Cardiff University who participated in Experiment 1 as unpaid volunteers. Most of them were between 20 and 23 years old (52%), 27% were between 24 to 27 years old, 13% were between 28 to 31 years old, 6% were between 32 to 35 years old and 2% were more than 36 years old; 30 participants (63%) were female and 18 participants (37%) were male; 63% were English native speakers.

Most participants were familiar with using the web. 52% spent between four to eight hours a week browsing the Internet for information, 31% spent 9 to 12 hours, 15% spent less than 3 hours and only 2% spent more than 12 hours; and 50% had between three to five years of web experience, 44% between 6 to 8 years and 6% had more than 8 years of experience.

## **5.3 Materials**

The materials used in this experiment were a printed instruction sheet and a set of questionnaires about the pictures and the texts (as described earlier in Chapter 4). Participants in Group 1 and 2 saw a display screen with four quadrants that contained two human interest pictures and two information graphics. The same picture, at the same size, was used both on the display screen and inside the news page. The picture on each quadrant was shown together with an unclickable headline. The first display screen served like a

dummy that only displayed pictures and headlines of the stories. A clickable “Next Story” button at the bottom of the display screen served as a link to the news stories. Participants had to read by scrolling down the page until the end of the story. This experiment used “off-line” measurement (Gunter, 2000, p.164) in which participants’ responses were captured after reading had ended.

#### **5.4 Reading environment**

In Experiment 1, the experimental sessions were held in a computer lab in the School of Journalism, Media and Cultural Studies at Cardiff University. This lab had 30 computers situated in the room in a U-shape. A U-shape arrangement of desks in the centre of the room (behind the computer terminal) provided a place to set the questionnaires until the participants were ready for them. Participants in Group 1 were directed to the computer terminals facing the windowed side of the room. Participants in Group 2 were directed to sit on the opposite side of the room and participants in Group 3 were directed to sit opposite the room entrance and facing the wall of the room represented by the bottom of the U. The lab layout made it so that the participants in different groups had their backs to one another to ensure that they had no idea about what was in the other participants’ screen. The researcher thought that if any participants entering the room happened to notice what was on the screens from across the room, it would influence the participants’ expectations concerning what they were about to read.

## **5.5 Procedure**

This experiment was conducted in several sessions with six to twelve participants in each session. As described in Chapter 4, a printed instruction sheet (see Appendix D) was given to participants, which asked them to write down on the instruction sheet their preferred order of reading the stories: A for story located on top left, B for story located on top right, C for story on bottom left, and D for story on bottom right.

After completing the hypothetical access on the instruction sheet, participants were asked to click on the “Next Story” button and read the story. After they finished reading each story, they clicked the “Next Story” button on the news page to see the next story, continuing until they had read all four stories. While doing these activities, participants were asked to record manually their start and finish reading time for each story from the clock shown on the task bar of the computer. Finally, the instruction sheet asked participants to rate the journalistic style of each story in terms of its language, content and layout.

After completing the instruction sheet, participants handed it to the researcher to get the questionnaire. After completing the questionnaire, they were then given a debriefing note and thanked for their participation in this study.

## **5.6 Results**

The data analysis focussed on hypothetical access, retention, reading time and assessment of the overall design. A two-tailed significance level of 0.05 was used for all statistical tests.

### 5.6.1 Access

#### ***Research Question 1: Does picture category influence the access of online news stories?***

The hypothetical access was analysed by comparing where the human interest and information graphics ranked in participants' preferred order of access. Access was analysed with the chi-square goodness-of-fit test. The results showed that picture category, either human interest or information graphic, had the same effect on access ( $\chi^2=3.06$ ,  $df=1$ , not significant). Of the 32 participants who saw news stories with graphics, 12 participants read news with human interest pictures first and 20 read news with information graphics first. Similarly, analysis of the story being read last showed that 20 participants read news with human interest last and 12 read news with information graphics last. This failure to find an effect of the human interest pictures on people's willingness to access the stories is at odds with the literature discussed in Chapter 2.

Another possible reason for the lack of a picture effect is that such effects may have been masked by either the story location or the news category. Therefore, both were analysed to see if they predicted order of access (see Table 5.1).

**Table 5.1**  
**Number of participants in all three groups who would read a news story first or last as a function of story location and news category**

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	<u>Read First</u>	<u>Read Last</u>
<b><u>Story Location/</u></b>		
<b><u>Quadrants:</u></b>		
A Top left	<b>14</b> (29.17%)	<b>8</b> (16.66%)
B Top right	<b>17</b> (35.42%)	<b>13</b> (27.08%)
C Bottom left	<b>9</b> (18.75%)	<b>8</b> (16.66%)
D Bottom right	<b>8</b> (16.66%)	<b>19</b> (39.58%)
<b><u>News Category:</u></b>		
Soft	<b>24</b> (50.00%)	<b>18</b> (37.50%)
Hard	<b>24</b> (50.00%)	<b>30</b> (62.50%)

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There are two ways of analysing the story location: top-bottom (AB and CD) and left-right (AC and BD). In an analysis of story locations on top-bottom direction, the result shows that vertical location did not influence readers to access the story ( $x^2=3.40$ ,  $df=1$ , not significant). The data in Table 5.1 showed that 31 participants said they would access news located on top quadrants first and 17 participants said they would access news located on bottom quadrants first. Similarly, analysis of location for news being read last showed no effect of vertical location – 21 participants said they would access news located on top quadrants last and 27 participants said they would access news located on bottom quadrants last.



The data also showed that there was no significant difference between the left and right screen locations for news being read first ( $\chi^2=1.55$ ,  $df=1$ , not significant). 23 participants said they would start with stories on the left of the screen and 25 participants said they would read stories on the right of the screen first. Similarly, 32 participants said they would read last the story in right location and 16 participants said they would read last the story in left location.

These results showed that participants had no preference for accessing news stories as a function of screen location. The reason might be due to participants' tendencies for choosing either a specific story or the same category of news stories irrespective of screen location or accompanying picture. Therefore, the news categories, soft or hard news, were analysed in order to examine their effect on access. The results showed that access was not influenced by news categories ( $\chi^2=1.06$ ,  $df=1$ , not significant). There were an equal number of participants who said they would read soft news and hard news first (24 participants for each category). Similarly, 18 participants said they would read soft news last and 30 participants would read hard news last.

In summary, the analysis suggested that picture category, story location and news category were not factors that influenced readers to access the news stories. The reason might be due to the hypothetical access that was used here where participants were not given any choices to access the news stories, as they would be able to do in a real reading situation.

## 5.6.2 Retention

### ***Research Question 2: Does picture category influence the retention of online news stories?***

The maximum score on the retention quiz was 7. The mean scores are shown in Table 5.2. The one-way analysis of variance (ANOVA) showed a significant effect of picture category on retention when the three conditions of pictures were considered together ( $F(2,77)=8.43$ ,  $p<0.001$ ). However, the planned comparison between the two picture categories showed that the retention score for stories with human interest pictures and information graphics did not differ ( $F(1,62)=3.82$ , not significant). In other words, both picture categories had the same influence on retention. From previous research as described in Chapter 3, it was expected that the information graphics would enhance retention, so the interest here focussed on the human interest pictures. The planned comparison between human interest picture and no picture condition showed that stories with human interest pictures were better remembered ( $F(1,46)=5.27$ ,  $p<0.05$ ). This indicates that pictures other than information graphics influence readers' retention of news stories.

**Table 5.2**  
**Retention scores (max=7) as a function of picture manipulation**

	Picture manipulation			F (2,77)	p
	Human Interest	Information graphic	No picture		
<b>Mean</b>	4.36a	4.92a	3.55b	8.43	0.01
<b>SD</b>	1.28	1.01	0.85		

*Means with common subscripts are not statistically different.*

### 5.6.3 Time spent reading

***Research Question 3: Does picture category influence the reading time of online news stories?***

The mean reading times are shown in Table 5.3. The one-way ANOVA revealed a significant effect of picture on reading time across the three picture manipulations ( $F(2,77)=9.79$ ,  $p<0.01$ ). Planned comparisons as for retention, showed that participants who saw information graphics took longer reading than those reading stories with human interest pictures ( $F(1,62)=5.90$ ,  $p<0.05$ ). Participants reading stories with human interest pictures took longer than those reading stories with no pictures ( $F(1,46)=5.30$ ,  $p<0.05$ ).

In summary, the addition of any graphics increased reading time, but particularly information graphics. This might be due to the complexity of the pictures, such as diagrams, maps or graphs that contained certain symbols, which needed close attention to understand their meaning. Or it might be due to the integrative processes between text and pictures, which required

participants' attention to identify text in relation to the pictures. Therefore, a separate measure of the time spent on the graphics and on the text would be helpful to clarify this result.

**Table 5.3**  
**Reading times (in seconds) as a function of picture manipulation**

	Picture manipulation			F (2,77)	p
	Human Interest	Information graphic	No picture		
<b>Mean</b>	152.81a	189.38b	115.31c	9.79	0.01
<b>SD</b>	60.65	59.73	32.73		

*Means with a common subscript are not statistically different*

#### 5.6.4 Assessment of overall design

***Research Question 4: Does picture category influence the reader's assessment of the overall design of the news website?***

##### **Summary:**

The results of the assessment ratings from the questionnaire showed that participants said they would be influenced to read news stories with pictures. Although the rating data suggested that participants would read news with pictures but they had no preference for either human interest or information graphics ( $F(1,94)=1.26$ , not significant).

The following sections discuss the influence of human interest pictures and information graphics on readers' assessment of overall design. The analysis

was divided into three sections: features that were enhanced by both human interest pictures and information graphics; features that were enhanced by human interest pictures; and features that were enhanced by information graphics.

#### **5.6.5 Features enhanced by both human interest pictures and information graphics**

Table 5.4 showed that mean writing style ratings for stories with human interest pictures was very similar to mean ratings for stories with information graphics and stories without pictures. Statistical analysis confirmed that they did not differ ( $F(2,77)=1.50$ , not significant). Participants rated the writing style without being influenced by picture category. When news with human interest pictures were compared with news without pictures, there was no significant difference in assessment of writing style between the two conditions ( $F(1,46)=2.55$ , not significant). The results indicate that the text was perceived independently of the pictures.

Similarly, Table 5.4 showed the mean ratings of interestingness for stories with human interest pictures was similar to news stories with information graphics and news stories without pictures ( $F(2,77)=0.78$ , not significant). Participants rated news with human interest pictures as interesting as news with information graphics. When news with human interest pictures were compared with news without pictures, there was no significant difference in interestingness between the two conditions ( $F(1,46)=1.71$ , not significant).

The results indicate that news stories with human interest pictures and information graphics were as interesting as news without pictures.

**Table 5.4**  
**Ratings of writing style and interestingness (max=5) as a function of picture manipulation**

	Human Interest	Information graphic	No picture	F (2,77)	p
<b>Writing Style</b>					
Mean	3.84	3.81	3.58	1.50	ns
SD	0.59	0.49	0.44		
<b>Interestingness</b>					
Mean	3.78	3.77	3.58	0.78	ns
SD	0.57	0.63	0.35		

#### 5.6.6 Features enhanced by human interest pictures

The features that were enhanced by human interest pictures were ratings for attractiveness and vividness. The mean attractiveness ratings for stories with human interest pictures (M=4.45, SD=0.56) were significantly higher than the mean ratings for stories with information graphics (M=4.11, SD=0.62) ( $F(1,62)=5.44$ ,  $p<0.05$ ). When news with human interest pictures were compared with news without pictures (M=2.69, SD=0.17), there was a significant difference in attractiveness ratings ( $F(1,46)=151.19$ ,  $p<0.01$ ).

Similarly, the mean vividness ratings for stories with human interest pictures (M=4.03, SD=0.62) were significantly higher than the mean ratings for stories

with information graphics ( $M=3.66$ ,  $SD=0.60$ ) ( $F(1,62)=6.02$ ,  $p<0.05$ ). When news with human interest pictures were compared with news without pictures ( $M=2.41$ ,  $SD=0.24$ ), there was a significant difference in vividness ratings ( $F(1,46)=101.00$ ,  $p<0.01$ ). These data show that participants rated news with human interest pictures as more attractive and vivid than news with information graphics and news stories without pictures.

### **5.6.7 Features enhanced by information graphics**

Table 5.5 shows the mean assessments of informativeness, clarity, understanding, organization and image creation, together with the results of statistical comparisons of human interest and information graphics. This analysis confirmed that these features were more enhanced by information graphics than the human interest pictures. Participants rated news with information graphics as informative, having greater clarity, easy to understand, clearly organized and creating many images to their mind.

**Table 5.5**  
**Features enhanced by information graphics**

<b>Features</b>	<b>Human Interest</b>	<b>Information graphic</b>	<b>F (1,62)</b>	<b>p</b>
<b>Informativeness</b>				
Mean	3.69	4.08	4.40	0.05
SD	0.88	0.58		
<b>Clarity</b>				
Mean	3.73	4.17	5.02	0.05
SD	0.92	0.60		
<b>Understanding</b>				
Mean	4.00	4.39	7.25	0.01
SD	0.60	0.56		
<b>Organization</b>				
Mean	3.78	4.19	11.41	0.01
SD	0.49	0.47		
<b>Image creation</b>				
Mean	3.56	4.05	10.10	0.01
SD	0.56	0.65		

## **5.7 Discussion**

The results of hypothetical access in this experiment suggested that both graphics, i.e., human interest and information graphics, have the same influence on access. This experiment failed to reveal the predicted effect of human interest pictures on access. In contrast to previous research described in Chapter 2 that the negative or threatening images have an effect on selective exposure, the results of this experiment showed no significant difference in access either by the human interest pictures or the information graphics.



There were several possible reasons for the non-significant difference of pictures effect on access in this experiment. Unlike negative or threatening images that can arouse readers' emotion, the human interest pictures and information graphics used in this study might be too neutral to influence readers. Readers might assume all the news stories either with or without pictures had the same levels of interest. Thus their order of access to the news stories was independent of the pictures.

Since the focus of Experiment 1 was on retention, the access to the news stories was measured hypothetically. It is important to note although both access, i.e., initial access and subjective assessment of access, were hypothetically measured they differed in their temporal relation to reading the text. The initial access was measured before participants read the news stories when they knew nothing about the relations between the picture and the news stories, while the subjective assessment of access was measured after participants had read the news and they understood the picture in relation to the news stories. This procedure might cause readers to respond differently as they may change their interpretation of the question. Perhaps, participants thought the later questions about the subjective assessment of access referred to pictures in general not just the specific pictures used in this study. The apparent conflict should disappear if the access were genuine and readers were given real choice about the order in which they read the news stories, as they do in their everyday reading activities. This issue will be addressed in Experiment 2.

The findings also revealed that story location was found to have no effect on access. Although Nielsen (1996) and Kirriemuir (1997) suggested that readers give more attention to items at the top of web pages, the results in this experiment revealed that story location either at the top or bottom of the screen seemed to have no effect on access. The contradiction may be caused by the hypothetical procedure used in this experiment, and the result may change if real choices are available.

Furthermore, the findings showed that news categories either hard or soft news, did not influence access. This result supported Graber's (1988) study who reported that print newspaper readers use a mixture of their own news interests and cues embedded in the presentation of news to guide their exposure decisions. Similarly, in a study of print and web-based readers of The New York Times, Tewksbury & Althaus (2000) found that online readers appeared to be focus their attention more on topics of personal interest and less on topics that interested news editors. Their research found evidence that people often used online news to supplement, not replace, their core news consumption. A common finding in surveys of Internet users is that people report going online to follow up on news they originally received offline (e.g., Pew Research Center, 1999). In relation to the current results, it is possible that the non-significant finding was due to the soft or hard news categories used in this study that were too general and might not interest the readers. Hence the mean ratings of interestingness being near the centre of the rating scale.

The findings of Experiment 1 also suggested that the human interest pictures and information graphics have the same effect on retention. Previous researchers, as described in Chapters 2 and 3, have shown that retention would be enhanced if the text were accompanied by an informative picture, compared to the text without a picture. One possible reason why both graphics had the same influence on retention might be due to the same picture of the same size being used in the display screen and in the text. Repeating the same picture in the text might not interest readers since they have encountered it earlier on the display screen. This suggests that readers may skim the pictures in the news page, but they give most of their attention to the text. As a result, readers can report having seen the picture, but they retain relatively little or nothing of its content. Thus the use of different pictures on the display screen and in the text might show an effect of picture category on retention. This issue will be dealt in Experiment 2.

Although both picture categories achieved the same retention, stories having human interest pictures were read significantly faster than those with information graphics. However, it is unclear whether the reading time was due to the time spent on the picture or on the text because reading time in this experiment was the combination of time spent on both pictures and text. This is another issue that will be explored in the next experiment with a separation of the time spent on the graphics and on the text.

In the assessment of the overall design, participants rated news stories with human interest pictures and information graphics as having the same writing

style as news without pictures. In addition, the news stories with human interest pictures and information graphics were rated as interesting as news without pictures. This means that readers' perception of the news stories was identical across all three conditions and their subjective ratings of writing style and interestingness were independent of the pictures.

In contrast, the results showed that stories with information graphics were rated as more informative, aiding clarity, easy to understand, more organized and creating more images in the reader's mind, whereas stories with human interest pictures were rated as more attractive and vivid. This divergence showed that the two picture categories had different effects on readers, and implies that it would be good to combine the two kinds of pictures in a story. This could be achieved by using a different type of picture on the display screen and in the text of the news stories.

As a conclusion, the findings of Experiment 1 suggest that a further experiment should be done in order to measure the pictures' effects on access, retention and reading time. Therefore, three of the questions raised by the data will be pursued in the next experiment. Firstly, does picture category influence access? Secondly, does picture category influence retention? Thirdly, is the longer reading time with information graphics spent mostly on the picture, or does it lead to additional reading of the text?

## CHAPTER SIX

### EXPERIMENT 2: THE EFFECTS OF PICTURES ON THE ORDER OF ACCESSING ONLINE NEWS STORIES

#### 6.0 Introduction

Experiment 2 was designed based on the results of the first experiment. Since pictures did not influence the access of news stories in Experiment 1 possibly due to the hypothetical access, a change was made in the access procedure to give readers a real choice in accessing the news stories. The influence of picture category was expected to exist during the inspection of the display screen as readers were given a real way of accessing the news stories in their own preferred order.

The results of Experiment 1 showed that readers took longer reading news with information graphics than news with human interest pictures and news without pictures. However, it did not show clearly whether that longer reading time was time spent on the text or on the graphics. The time for reading the text and time for looking at the picture should be recorded separately in order to examine the picture effects. It is generally the case that the longer people study a text, the better their retention will be. So if the pictures encouraged readers to study the text more attentively, this might be why the human interest pictures and information graphics gave similar performance on the retention quiz. Or maybe they simply spent the time looking at the picture in

order to check if it was the same as what they saw before. On the other hand, the extra time might be spent on the picture itself, in which case the informativeness of the picture should influence retention quiz performance.

In order to be able to separate out time on the text and time on the graphic, all pictures in the text were shown as thumbnails, which needed to be clicked to be expanded and viewed comfortably. Whereas in Experiment 1 the picture on the front display screen was identical to that in the text, a change was made so that if the front screen showed a human interest picture that in the text was an information graphic, and vice versa. This meant that readers had not seen the graphic in the text before they encountered the thumbnail.

In order to measure these two different reading times, a set of log files was developed to record unobtrusively when readers clicked on the screen. Each click was captured with a timestamp that recorded every action done by the readers during their online reading activity. In other words, reading time in Experiment 2 will take into account the time for reading the text and time for looking at the picture.

## **6.1 Experimental design**

Like Experiment 1, this experiment used a mixed factorial design and participants were divided into three groups. The same two independent variables as in Experiment 1, picture category and news category were used. The dependent variables were the same as in Experiment 1 but a change was made on measuring access. Unlike Experiment 1, which used a hypothetical

access, Experiment 2 used real access, which was recorded during the experiment. There was also a change in procedure where individual testing was used rather than group testing.

## **6.2 Participants**

There were 24 students from Cardiff University who participated in Experiment 2. They were allocated to the three experimental groups. Most of the participants (50%) were between 20 to 23 years old, 29% were between 24 to 27 years old, 17% were between 28 to 31 years old and 4% were between 32 to 35 years old; 13 participants (54%) were female and 11 participants (46%) were male; 71% were English native speakers.

Most participants were experienced web users. 54% spent between four to eight hours a week browsing the Internet for information, 29% spent between nine to twelve hours and 17% spent less than 3 hours; and 50% had between three to five years of web experience, 38% had between six to eight years and 12% had more than eight years of experience. Participants in Experiment 2 were similar to those in Experiment 1 in terms of their age and web experience so that the results were not confounded by age and experience factors.

## **6.3 Materials**

Experiment 2 used the same stories and pictures as in Experiment 1 but there were differences in terms of picture order, picture size, instruction, headline and the reading time recording. Experiment 1 used the same picture and in a

same size both on the display screen and in the news page, but the pictures used in Experiment 2 were different in both locations. This means that if the display screen used the human interest picture, the news page used the information graphic that appeared as a small 'thumbnail' which expanded to a pop-up, overlapping the text. This pop-up had to be closed in order to continue reading the text. The instruction to expand and close the picture would indicate how long readers looked at and studied the picture.

Unlike Experiment 1 that used a printed instruction sheet, Experiment 2 used online instructions (see Figure 6.1), which were displayed as a welcome page on the computer screen. The instruction contained steps that participants had to follow while doing the experiment. They began the experiment by clicking the "Start" button at the bottom of the instruction page that led them to a display screen with the four available stories.

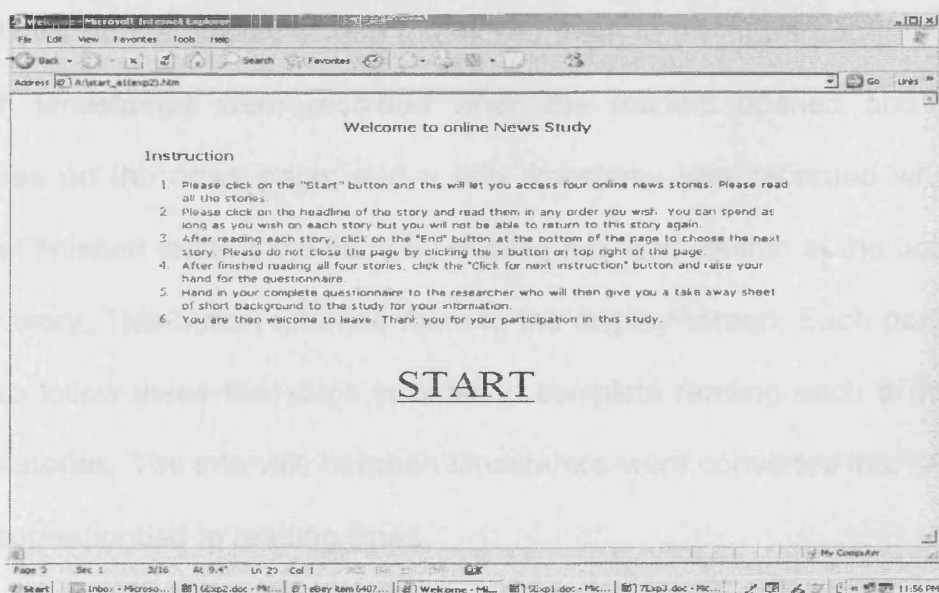


Figure 6.1 A screen shot of the online instruction sheet



As described in Chapter 4, each participant saw an online display screen in which the screen was divided into four quadrants, with each quadrant containing a picture and headline of a news story (see Figure 4.1). The distribution of human interest pictures and information graphics on this display screen was the same as in Experiment 1. In order to give the participants direct access to the news story, the headline of each story in the display screen was changed into a clickable headline. Participants were allowed to read the story for as long as they wished but once read the headline and the picture disappeared from its quadrant on the front display screen. This meant that participants could not re-access the story that had been read.

In Experiment 2, the reading time was automatically recorded by timestamps. The first timestamp was recorded when the reader clicked on the “Start” button on the welcome page that linked them to the display screen with four stories. The second timestamp was recorded when the reader clicked on the first news on the display screen that linked them to the news page; third and fourth timestamps were recorded when the readers opened and closed pictures on the news page; and a fifth timestamp was recorded when the reader finished reading the story by clicking the “End” button at the bottom of each story. This button returned them to the display screen. Each participant had to follow these five steps in order to complete reading each of the four news stories. The intervals between timestamps were converted into seconds that corresponded to reading times.

The apparatus for developing the web page consisted of a Dell laptop computer, which runs on Windows XP Professional and Macromedia Dream Weaver MX for designing and producing web site and administering all the online materials. The reason for changing the computer used was due to the Internet Protocol (IP) address conflicts between users in the lab computer. This technical problem prevented the log files recording the reading activities in Experiment 1.

#### **6.4 Reading environment**

For Experiment 2, the sessions were held in a quiet room in the School of Journalism, Media and Cultural Studies. The session was administered on a one to one basis due to the change of apparatus used in this experiment and the participants came at the time agreed before the experiment.

#### **6.5 Procedure**

The procedure used in Experiment 2 is summarized as follows:

1. Participants were given a welcome page displayed on the computer screen that contained the instructions for the experiment.
2. By clicking the "Start" button on the welcome page, participants were taken to a display screen, which contained four different stories (two hard news and two soft news) with two different types of pictures, namely two human interest pictures and two information graphics.
3. Participants were asked to read all four stories for as long as they wished but they could not re-access the story once it had been read.

4. After all four stories had been read, the four quadrants on the display screen disappeared and the only button left on the display screen was "Click for next instruction" button. Once clicked, participants were taken to a new page that said "Please tell Normah that you have finished".
5. Participants then raised their hand for the questionnaire. They had to hand in the completed questionnaire to the researcher who gave them a sheet containing a short background to the study that they could take away.
6. Participants were then welcome to leave. They were thanked for their participation in this study.

## **6.6 Results**

The data analysis in Experiment 2 focussed on the order in which the stories were accessed, retention, reading times for text and for pictures, and assessment of the overall design. Access was analysed according to the first news being clicked, second, third and last by looking at the log file that recorded those activities. The log file was also analysed to measure the time for reading the text and time for looking at the picture. The questionnaire was analysed to compare retention and assessment of the overall design across picture conditions. A two-tailed significance level of 0.05 was used for all statistical tests.

### 6.6.1 Access

#### ***Research Question 1: Does picture category influence the access of online news stories?***

The results of access which was analysed with the chi-square goodness-of-fit test showed that picture category, either human interest or information graphic, had the same effect on access ( $\chi^2=0.13$ ,  $df=1$ , not significant). Of the 16 participants who saw news stories with graphics, 7 participants read first news with human interest pictures on the display screen and 9 participants first read news with an information graphic on the display screen. Similarly, analysis of the story being read last showed that 9 participants read last news with human interest on the display screen and 7 participants read last news with an information graphic on the display screen. This finding is consistent with the data from hypothetical access in Experiment 1.

**Table 6.1****Number of participants who read a news story first or last as a function of story location and news category**


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	<u>Read First</u>	<u>Read Last</u>
<b><u>Story Location/</u></b>		
<b><u>Quadrants:</u></b>		
A Top left	<b>7</b> (29.17%)	<b>8</b> (33.33%)
B Top right	<b>4</b> (16.66%)	<b>6</b> (25.00%)
C Bottom left	<b>10</b> (41.67%)	<b>4</b> (16.67%)
D Bottom right	<b>3</b> (12.50%)	<b>6</b> (25.00%)
<b><u>News Category:</u></b>		
Soft	<b>11</b> (45.83%)	<b>7</b> (29.17%)
Hard	<b>13</b> (54.17%)	<b>17</b> (70.83%)

---

Data from participants in all three groups were included in the analysis of the effect of screen location and news category. As can be seen in Table 6.1, access was not influenced by story location in top or bottom position ( $\chi^2=0.33$ ,  $df=1$ , not significant). 11 participants accessed first news located on top quadrants and 13 participants accessed first news located on bottom quadrants. Similarly, analysis of location for news being read last showed that 14 participants accessed news located on top quadrants last and 10 participants accessed news located on bottom quadrants last. This also replicates the findings from the hypothetical access in Experiment 1.

Statistical analysis confirmed that access was not influenced by story location to the left or right of the screen ( $\chi^2=1.39$ ,  $df=1$ , not significant). 17 participants read first the news located on left side of the screen and 7 participants read first news story on the right side of the screen. For news read last, it showed that an equal number of participants (12) read stories located either on left or right side of the screen. These results confirmed findings in Experiment 1 that story location had no effect on access.

Similarly, news category also had no effect on access ( $\chi^2=0.80$ ,  $df=1$ , not significant). 11 participants accessed soft news first and 13 participants accessed hard news first. Similarly, analysis of the news category being accessed last showed that 7 participants accessed soft news last and 17 participants accessed hard news last. This is consistent with the results of Experiment 1.

## 6.6.2 Retention

### ***Research Question 2: Does picture category influence the retention of online news stories?***

The maximum score on the retention quiz was 7. Since the order of reading the stories was determined by participants, there is potentially a confounding of order effects, although the access data suggests this may not have been very great. The mean scores are shown in Table 6.2. The one-way analysis of variance (ANOVA) showed a significant effect of picture on retention when the three picture conditions were considered together. When retention was measured separately between the two categories of pictures, a one-way

ANOVA revealed that the retention of stories with information graphics was higher than retention of stories with human interest pictures ( $F(1,30)=7.16$ ,  $p<0.05$ ). Similarly, the planned comparison between human interest pictures and no picture condition showed that stories with human interest pictures were better remembered ( $F(1,22)=37.50$ ,  $p<0.01$ ). This indicates that picture category had an influence on readers' retention of the news stories.

**Table 6.2**  
**Retention scores (max=7) as a function of picture manipulation**

	Picture manipulation			F (2,37)	p
	Human Interest	Information graphic	No picture		
<b>Mean</b>	4.53a	5.16b	3.03c	29.99	0.01
<b>SD</b>	0.59	0.72	0.51		

*Means with a common subscript are not statistically different*

### 6.6.3 Time spent reading

***Research Question 3: Does picture category influence the reading time of online news stories?***

The mean reading time for stories with human interest pictures, information graphics and no pictures are shown in Table 6.3. The initial analysis of reading times used the total time for reading both the text and the picture. The one-way ANOVA revealed a significant effect of picture category on reading time across the three picture manipulations. When stories included an information graphic, participants took longer reading the story than when the

story included a human interest picture ( $F(1,30)=9.54, p<0.01$ ). Furthermore, analysis showed that participants with text only read faster than those with human interest pictures ( $F(1,22)=5.17, p<0.05$ ). This finding is consistent with the data from reading times in Experiment 1.

**Table 6.3**  
**Total reading time as a function of picture manipulation**

	Picture manipulation			F (2,37)	p
	Human Interest	Information graphic	No picture		
<b>Mean</b>	86.66a	112.72b	66.56c	12.64	0.01
<b>SD</b>	23.12	24.59	12.77		

*Means with a common subscript are not statistically different*

When time spent reading the text and the pictures was analysed separately (Table 6.4) there was no significant difference between text reading time as a function of picture category ( $F(1,30)=0.36$ , not significant). This suggested participants spent about the same time reading the text regardless of pictures.



**Table 6.4**  
**Time spent reading the text**

	Picture manipulation			F (2,37)	p
	Human Interest	Information graphic	No picture		
<b>Mean</b>	71.03	76.25	66.56	0.36	ns
<b>SD</b>	23.06	26.23	12.77		

Analysis of the time spent looking at the pictures (Table 6.5) confirmed that participants spent longer studying information graphics than human interest pictures ( $F(1,30)=37.13$ ,  $p<0.01$ ). In summary, the addition of information graphics affected reading time due to the nature of the picture itself, which was read and looked at for longer.

**Table 6.5**  
**Time spent looking at picture**

	Picture manipulation		F (1,30)	p
	Human Interest	Information graphic		
<b>Mean</b>	15.63	36.47	37.13	0.01
<b>SD</b>	6.09	12.25		

#### **6.6.4 Assessment of overall design**

***Research Question 4: Does picture category influence the assessment of the overall design of the news website?***

##### **Summary:**

The results of the assessment ratings from the questionnaire in Experiment 2 confirmed the results of Experiment 1 in that participants again said they would be influenced to read news stories with pictures. Although the rating data suggested that participants would read news with pictures but they had no preference for either human interest or information graphic ( $F(1,46)=0.06$ , not significant).

The following sections discuss the influence of human interest pictures and information graphics on readers' assessment of overall design. The first section discusses features that were enhanced by both human interest pictures and information graphics; the second section discusses features that were enhanced by human interest pictures and the third section discusses features that were enhanced by information graphics.

#### **6.6.5 Features enhanced by both human interest pictures and information graphics**

Table 6.6 showed the results of subjective ratings that both pictures have the same effect on writing style and interestingness of the news stories. News stories with human interest pictures and information graphics were rated as well written as news without pictures ( $F(2,37)=1.91$ , not significant). When news with human interest pictures were compared with news without pictures,

there was no significant difference in assessment of writing style between the two conditions ( $F(1,22)=1.63$ , not significant).

Similarly, news stories with human interest pictures and information graphics were rated as interesting as news without pictures ( $F(2,37)=1.56$ , not significant). When news with human interest pictures were compared with news without pictures, there was no significant difference in interestingness between the two conditions ( $F(1,22)=1.11$ , not significant). The finding confirmed the results in Experiment 1 and indicated that picture category had no effect on assessments of writing style and interestingness of the news stories.

**Table 6.6**  
**Ratings of writing style and interestingness (max=5) as a function of picture manipulation**

	<b>Human Interest</b>	<b>Information graphic</b>	<b>No picture</b>	<b>F (2,37)</b>	<b>p</b>
<b>Writing Style</b>					
Mean	3.50	3.63	3.25	1.91	ns
SD	0.45	0.43	0.27		
<b>Interestingness</b>					
Mean	3.66	3.81	3.44	1.56	ns
SD	0.62	0.47	0.35		

### **6.6.6 Features enhanced by human interest pictures**

The results supported the findings of Experiment 1 in that attractiveness and vividness were enhanced by human interest pictures. On the 5-point rating scale, the mean attractiveness rating for stories with human interest pictures was 4.88 (SD=0.56) and for stories with information graphics was 3.88 (SD=0.59) ( $F(1,30)=24.00$ ,  $p<0.01$ ). When news with human interest pictures were compared with news without pictures ( $M=3.09$ ,  $SD=0.30$ ), there was a significant difference in attractiveness ratings ( $F(1,22)=69.36$ ,  $p<0.01$ ).

Similarly, the mean vividness rating for stories with human interest pictures ( $M=4.16$ ,  $SD=0.57$ ) was significantly higher than for stories with information graphics ( $M=3.13$ ,  $SD=0.39$ ) ( $F(1,30)=35.90$ ,  $p<0.01$ ). When news with human interest pictures were compared with news without pictures ( $M=2.66$ ,  $SD=0.23$ ), there was a significant difference in vividness ratings ( $F(1,22)=50.51$ ,  $p<0.01$ ). These results confirmed findings in Experiment 1 that news with human interest pictures were rated as attractive and vivid.

### **6.6.7 Features enhanced by information graphics**

Table 6.7 shows the mean assessments of informativeness, clarity, understanding, organization and image creation, together with the results of statistical comparisons of picture category. This analysis confirmed the findings in Experiment 1 that these features were more enhanced by information graphics than the human interest pictures. Participants rated more highly news with information graphics as informative, adding clarity, easy to understand, clearly organized and creating many images to their mind.

**Table 6.7**  
**Features enhanced by information graphics**

<b>Features</b>	<b>Human interest</b>	<b>Information graphic</b>	<b>F (1,30)</b>	<b>p</b>
<b>Informativeness</b>				
Mean	3.47	4.56	40.03	0.01
SD	0.34	0.60		
<b>Clarity</b>				
Mean	3.94	4.69	13.67	0.01
SD	0.48	0.66		
<b>Understanding</b>				
Mean	4.09	4.88	15.65	0.01
SD	0.58	0.53		
<b>Organization</b>				
Mean	3.78	4.25	11.76	0.01
SD	0.36	0.41		
<b>Image creation</b>				
Mean	3.84	4.50	15.07	0.01
SD	0.40	0.55		

## **6.7 Discussion**

The findings of Experiment 2 also failed to show a significant difference of pictures effect on access and supported the data from Experiment 1. Both picture categories had the same influence on access, and story location and news category did not influence access. As explained in Experiment 1, the same effect of pictures on access might due to the pictures themselves that may have been too neutral to attract readers' attention. And it could also due to the news story content that was too general in a sense that it might not interest readers to read.

Furthermore, participants might have a strategy in choosing to read the stories in an order that was independent of the pictures. This means that while choosing the story to read, readers may not have considered the pictures but they were more concerned to finish reading all four stories. Therefore, one possibility is that access effects of picture category might appear if the participants were given a choice to read only a limited number of stories, e.g., two news stories. The following experiment will further examine the issue of choice when readers have fewer constraints.

The findings of Experiment 2 showed that effects of picture category were obtained on the measures of retention. Unlike the results in Experiment 1 where the human interest pictures and information graphics had the same effect on retention, Experiment 2 revealed that the information graphics enhanced memory and helped retention of the news stories more than the human interest pictures, although the human interest pictures were better than no picture at all. The difference in retention findings between Experiment 1 and Experiment 2 indicate the benefit of using different pictures on display screen and in the text of the news stories. The picture category effect was obtained when the pictures were different. One possible reason is that participants may study the picture in the text because it was different from what they had encountered on the display screen or vice-versa. There is also a possibility that readers tried to connect the two different picture categories they encountered on display screen and in the text with the news stories. The possibility of remembering the news with two different categories of pictures in

Experiment 2 would influence greater retention than remembering news with the same picture as in Experiment 1.

Unlike previous research in educational psychology, which suggests that retention enhanced by one category of graphic, i.e., information graphics, the current finding moves a step forward to show that the incorporation of human interest pictures can also enhanced retention. The reason might due to the human interest pictures increasing readers' motivation, which results in them remembering better as compared to news without pictures.

In a separate analysis of time spent on the pictures and on the text, the data showed that readers spent about the same time on the text regardless of the pictures. Readers took longer reading news with information graphics than news with human interest pictures because they took more time to study the information graphics than the human interest pictures. This implies that additional information processing occurred while reading information graphics. Readers may refer to the information graphics as they read through the text in order to understand the content of the picture. As a consequence, the information will have stayed in memory and helped readers to remember the news with information graphics better than news with human interest pictures.

Findings in Experiment 2 also replicated the data from the assessment of the overall design in Experiment 1. Participants rated both human interest pictures and information graphics as having the same influence on writing style and interestingness of the news stories. In other words, they rated the

news stories as identical and interesting regardless of the pictures. The results also showed that stories with information graphics were rated as more informative, aiding clarity, easy to understand, more organized and creating more images in the reader's mind, whereas stories with human interest pictures were rated as more attractive and vivid.

In conclusion, effects of picture category in Experiment 2 were obtained for retention and reading times. Since one purpose of this study was to explore picture effects on access, a further investigation is needed to see if this missing effect can be found if readers are given a real choice to read only two out of four news stories available. This issue will be addressed in Experiment 3. The effects of picture category on retention and reading times were also examined in the next experiment in order to confirm the findings in Experiment 2.



## **CHAPTER SEVEN**

### **EXPERIMENT 3: THE EFFECTS OF PICTURES ON THE NON-ACCESS OF ONLINE NEWS STORIES**

#### **7.0 Introduction**

The results in Experiment 1 and 2 suggested that human interest pictures and information graphics did not differ in their effects on access. The non-significance difference of pictures effect on access in Experiment 1 might due to the order of access to the news stories that was controlled by the researcher. Participants did not have direct access to the story and their access was measured hypothetically. This problem was overcome in Experiment 2, but readers' access was still influenced similarly by both picture categories. Another possible reason is that in both experiments participants were asked to read all four news stories. If people have to do this they may feel it does not matter which order they read in. So this may have caused them to adopt an ad hoc strategy that was independent of the pictures and they may have randomly selected any story as a starting point. To check this possibility, in Experiment 3 participants only had to read two of the four stories, so giving them real choice. It was predicted that readers would choose to access the news stories having human interest pictures on the front display screen.

## **7.1 Experimental design**

This experiment used a between-groups design where participants were randomly assigned to one of the two conditions. As in Experiment 2, participants could directly access the story from the display screen by clicking the headline of the news stories. The only difference was that they had to read only two stories instead of all four stories as in Experiments 1 and 2. The main measure was which two news stories were selected and in which order participants read the stories.

## **7.2 Participants**

There were 16 participants who took part in Experiment 3. Participants were allocated into two groups only, either Group 1 or Group 2. 8 participants (50%) were between 20 and 23 years old, 19% each were between 24 to 27 and 28 to 31 years old and 12% were between 32 to 35 years old; 9 participants (56%) were female and 7 participants (44%) were male; 69% were English native speakers.

As in both previous experiments, most participants were experienced web users. 56% spent between four to eight hours a week browsing the Internet for information, 25% spent less than 3 hours and 19% spent between 9 to 12 hours; and 56% had between 3 to 5 years of web experience, 38% had between 6 to 8 years and 6% had more than 8 years of experience. The participants in this experiment were similar to those in Experiments 1 and 2 in terms of their age and web experience.

### 7.3 Materials

The materials used in Experiment 3 were the same as in Experiment 2. The only change was to the instruction about how many news stories to read, which was now two instead of all four (see instruction in Figure 7.1). Only the two picture conditions were involved. There was no need to have a text only condition because the purpose of Experiment 3 was to focus on the effect of picture category on access. As described in Chapter 4, the four different locations of the stories on screen reflected a *Latin-square* design, with each story occurring equally often in each screen position. As in Experiment 2, once a story had been read, it vanished from the quadrant on the display screen.

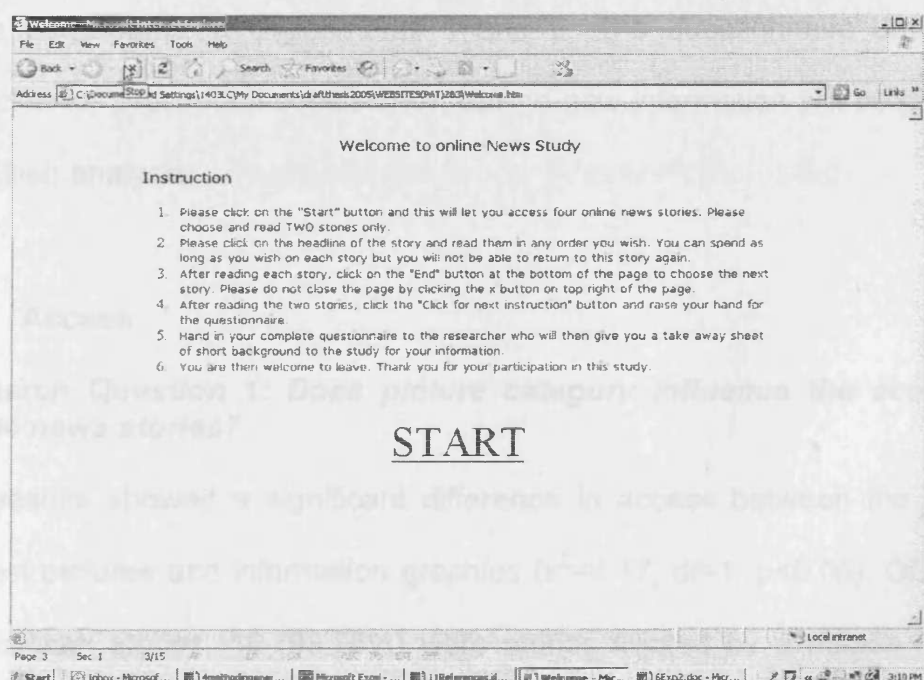


Figure 7.1 A screen shot of the online instruction sheet (read two only)

## 7.4 Reading environment

The reading environment in Experiment 3 was exactly the same as in Experiment 2.

## 7.5 Procedure

Apart from reading two instead of four stories, the procedures used in Experiment 3 were the same as in Experiment 2.

## 7.6 Results

Although the main aim of Experiment 3 was to examine the effects of picture category on access, the results on retention and reading time will also be reported in order to show that the participants in Experiment 3 were similar to those participants in Experiments 1 and 2. The questionnaire data were collected for procedural consistency, but no new information will be obtained from their analysis.

### 7.6.1 Access

#### ***Research Question 1: Does picture category influence the access of online news stories?***

The results showed a significant difference in access between the human interest pictures and information graphics ( $\chi^2=4.17$ ,  $df=1$ ,  $p<0.05$ ). Of the 16 first chosen stories, 15 (93.75%) were stories fronted by a human interest picture, and only one (6.25%) was to a story fronted by an information graphic. In contrast, analysis of the second story being read showed that 9 participants read news with human interest second and 7 participants read

news with information graphic second. This indicates that the effect of picture category on access only emerged when readers were given choices about whether to read or not, and even then only on the first story accessed – i.e., it does not seem to be a very robust effect.

As can be seen in Table 7.1, among 15 participants who accessed the news with human interest picture, 7 (46.67%) were attracted to access first the crime news. The reason might due to the human interest pictures, i.e., photo of the twin sisters who have been murdered being more attractive than the information graphics, i.e., maps of the location where the murderer was captured.

**Table 7.1**  
**Influence of display screen graphic on readers' choice of first story**

<b>Story</b>	<b>Human interest</b>	<b>Information graphic</b>
Health	4	1
Science	1	0
Crime	7	0
Economics	3	0
<b>Total</b>	<b>15</b>	<b>1</b>

Analysis of story locations in top-bottom position showed that this did not influence access to the stories ( $\chi^2=1.20$ ,  $df=1$ , not significant). The data in

Table 7.2 showed that 12 participants accessed news located on top quadrants first and 4 participants accessed news located on bottom quadrants first. Similarly, 8 participants accessed news located on top quadrants last and 8 participants accessed news located on bottom quadrants last. These are chance variations and are consistent with the findings of Experiments 1 and 2.

The data also showed that there was no significant difference between the left and right locations for news being read first or last ( $\chi^2=0.50$ ,  $df=1$ , not significant). 10 participants read a story on the left first and 6 participants read a story on the right first. Similarly, for 9 participants the last story read was on the right and for 7 participants it was on the left. Again these chance variations are consistent with the findings of Experiments 1 and 2.

Furthermore, news category was also found to have no effect on access ( $\chi^2=2.01$ ,  $df=1$ , not significant). 6 participants accessed soft news first and 10 participants accessed hard news first. Analysis of the news category being accessed last showed that 11 participants accessed soft news last and 5 participants accessed hard news last. Again these chance variations are consistent with the findings of Experiments 1 and 2.

**Table 7.2**

**Number of participants who read a news story first or second as a function of picture, story location and news category**

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	<b>First story</b>	<b>Second story</b>
<b><u>Picture:</u></b>		
Human interest	<b>15</b> (93.75%)	<b>9</b> (56.25%)
Information graphic	<b>1</b> ( 6.25%)	<b>7</b> (43.75%)
<b><u>Story Location:</u></b>		
A Top left	<b>7</b> (43.75%)	<b>4</b> (25.00%)
B Top right	<b>5</b> (31.25%)	<b>4</b> (25.00%)
C Bottom left	<b>3</b> (18.75%)	<b>3</b> (18.75%)
D Bottom right	<b>1</b> ( 6.25%)	<b>5</b> (31.25%)
<b><u>News Category:</u></b>		
Soft	<b>6</b> (37.50%)	<b>11</b> (68.75%)
Hard	<b>10</b> (62.50%)	<b>5</b> (31.25%)

---

### 7.6.2 Retention

***Research Question 2: Does picture category influence the retention of online news stories?***

Table 7.3 shows that the effect of picture category on retention in Experiment 3 was similar to that found in Experiment 2. The one-way analysis of variance (ANOVA) showed a significant effect of picture category on retention ( $F(1,30)=11.25, p<0.01$ ). The retention of information from news stories

accompanied by human interest pictures (M=4.50, SD=0.61) was significantly less than that from news stories accompanied by information graphics (M=5.25, SD=0.66). This finding confirmed the finding of Experiment 2.

**Table 7.3**  
Retention as a function of picture category within the text

	Human Interest		Information Graphic		F	p
	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>		
<b>Experiment 1</b>	4.36	1.28	4.92	1.01	3.82	ns
<b>Experiment 2</b>	4.53	0.59	5.16	0.72	7.16	0.01
<b>Experiment 3</b>	4.50	0.61	5.25	0.66	11.25	0.01

### 7.6.3 Time spent reading

***Research Question 3: Does picture category influence the reading time of online news stories?***

The pattern of results for the overall time spent reading was similar to that found in Experiments 1 and 2. The one-way ANOVA revealed a significant effect of picture category on reading time with stories having human interest pictures accessed from the text being read faster than those with information graphics ( $F(1,30)=22.17, p<0.01$ ).

As can be seen in Table 7.4, the results across the three experiments revealed that reading time was slower when stories contained information graphics. The reading time in Experiment 1 was different from those in



Experiment 2 and 3 probably due to the recording method. Participants in Experiment 1 recorded their reading time manually whereas reading time in Experiments 2 and 3 was automatically recorded by the log files which tracked every click made. There was a possibility that readers used estimation in recording the reading time in Experiment 1.

**Table 7.4**  
**Time spent reading (in seconds) as a function of picture category within the text**

	Human Interest		Information Graphic		F	p
	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>		
<b>Experiment 1</b>	152.81	60.65	189.38	59.73	5.90	0.05
<b>Experiment 2</b>	86.66	23.12	112.72	24.59	9.54	0.01
<b>Experiment 3</b>	72.91	10.38	87.66	7.02	22.17	0.01

When reading time was analysed separately for time on text and time on picture as in Table 7.5, there was a non-significant difference between time spent reading the text either with human interest picture or information graphic ( $F(1,30)=1.48$ , not significant). Participants took about the same time reading the text regardless of picture. Again this finding was consistent with the finding of Experiment 2.

**Table 7.5**  
**Time spent reading the text**

	Picture manipulation		F (1,30)	p
	Human Interest	Information graphic		
<b>Mean</b>	56.78	60.94	1.48	ns
<b>SD</b>	10.28	9.02		

Consistent with the finding of Experiment 2, Table 7.6 showed that there was a significant difference between time spent looking at pictures ( $F(1,30)=58.78$ ,  $p<0.00$ ). Participants spent longer looking at the information graphics than at the human interest pictures. Taken together, the data showed that participants took longer reading news with information graphics due to the time spent looking at the picture.

**Table 7.6**  
**Time spent looking at pictures**

	Picture manipulation		F (1,30)	p
	Human Interest	Information graphic		
<b>Mean</b>	16.13	26.72	58.78	0.01
<b>SD</b>	3.80	4.02		

## 7.7 Discussion

The results of Experiment 3 showed that picture category had an effect on access when readers were given an option not to read some of the news stories. However, a significant effect was found only on the first story read, in which the human interest picture was more likely to attract readers than the information graphic. In contrast to previous research in Chapter 2 that showed negative or threatening images influence access, the current findings indicate that initial access to the news stories can also be influenced by less emotional human interest pictures.

Similar to findings in Experiments 1 and 2, story location and type of news story (hard or soft) did not influence the likelihood of readers accessing the story. Therefore, Experiment 3 has shown that readers are more likely to access a story that is illustrated by a human interest picture than the same story illustrated by information graphics. However, this attraction by the human interest picture only existed for the first story chosen. The access effect was not emerged for the second choices might due to the option of not to read that creates a possibility for participants to use a strategy, i.e., if the first picture chosen was human interest, the second picture should be information graphic, or vice-versa.

Consistent with findings in Experiment 2, the retention score for news with information graphics was significantly higher than retention score for news with human interest pictures. A possible reason was that the content of the information graphic itself needed closer attention and more cognitive

processing as compared to the human interest pictures. Evidence for this comes from the analysis of the time data. When reading time was analysed separately, it showed that participants took about the same time reading the text with human interest pictures and news with information graphics. However, the findings of time spent looking at pictures showed that participants took significantly longer looking at information graphics than human interest pictures. Clearly, reading news with information graphics took longer time because of the time spent looking at the picture. The greater attention to this type of graphic, in turn took more time to understand its meaning. So people were thinking about the news stories for longer. And as a consequence, the longer the time spent looking at the picture, the longer the information will be active in memory and the higher the retention will be.

In conclusion, Experiment 3 revealed that human interest pictures could attract readers initially to access specific news stories. The information graphics increased reading time due to the time spent looking at the picture, which in turn enhanced readers' retention of the news stories.

## CHAPTER EIGHT

### GENERAL DISCUSSION, LIMITATIONS AND CONCLUSIONS

#### 8.0 Discussion

The findings of Experiment 3 expand our knowledge of how pictures influence the access and retention of online news stories. Results for the picture manipulation in Experiment 3 suggest that different types of pictures serve different purposes. It was observed that the incorporation of human interest pictures in online displays of news headlines initially increased access to the news stories. Unlike past research on access or selective exposure which concentrated on disturbing images (Mundorf, Drew, Zillmann, & Weaver, 1990), negative images (Newhagen & Reeves, 1992), negative emotional images (Brosius, 1993), danger-signaling photographs (Gibson & Zillmann, 2000), agonistic or victimization images (Zillmann, Knobloch, & Yu, 2001), and threatening images (Knobloch, Hastall, Zillmann, & Callison, 2003; Sargent, 1998, 2005), the current outcome illustrates that access was not only influenced by negative or threatening images but also by relatively neutral human interest pictures.

## 8.1 Access

Results of Experiments 1, 2 and 3 showed different effects of picture category on access. Although Experiments 1 and 2 used a different measure of access, both experiments produced similar results in which readers rated human interest pictures and information graphics as having the same influence on access. The reason might be the hypothetical measure and reader's subjective ratings used in Experiment 1 that were too insensitive to detect the effect of picture category on access. Furthermore, the non-significant result of access in Experiment 2 might be due to the amount of news that readers had to read. In Experiment 2, readers had four choices of accessing the news stories from the display screen. These had to be read and clicked one after another. When readers were confronted with this situation, they might use an ad-hoc strategy to finish reading that was independent of the pictures. In other words, readers may simply choose any order of access as long as they can finish reading all four stories. And as a consequence, the influence of picture category on access was not apparent in Experiment 2.

Since both experiments had failed to reveal any differences of picture category on access, Experiment 3 was designed to give readers real access and choices of not to read some of the news stories, by being asked to read only two out of four stories. Wright (1988, p. 324) suggests that the readers' choice of not reading is not simply the absence of reading but rather a deliberate strategic decision taken by the reader. The results of Experiment 3 confirmed this notion

when it revealed a significant effect of human interest pictures on access particularly on people's first choice only.

The results of influences on access in Experiment 3 also support the notion of image affect reported by Sargent (2005). The image affect was observed in the human interest pictures which probably produced an affective reaction in readers that stimulated greater access to the pictures. For example, among the human interest pictures studied, the photo of twin sisters who were murdered was highly accessed. Perhaps, this photo contained an emotional element that attracted participants to know more about the story. This is consistent with the findings of an earlier investigation (Zillmann, 1998). Zillmann argued that one aspect of human nature is the constant monitoring of the environment for signs of danger (also see Lasswell, 1948; Newhagen & Reeves, 1992; Shoemaker, 1996). When individuals encounter a potential threat, subsequent information enjoys greater perceived utility leading to a more cautious and systematic evaluation. In a similar vein, Nabi (1999) contends that when people are aware of signs of danger in their environment, certain emotions are activated (i.e., anxiety, fear, sadness) which, in turn, influences more in-depth information processing.

On the other hand, the bias in readers' choice is not necessarily based on emotion. The decision to choose the news story could be based on their past experience of finding interesting stories linked with human interest pictures. As described earlier in Chapter 2, readers have often encountered news stories with

human interest pictures and might feel comfortable with this because journalists often present their news stories with these types of pictures. As a result, readers might associate interesting news stories with human interest pictures and therefore these pictures influence them to access the news stories.

In summary, this series of studies extends the research literature by showing that less emotional human interest pictures can also have an effect on access besides negative or threatening images. The results that showed both picture categories have the same effect on access, especially in Experiments 1 and 2, suggest that there is an influence of information graphics on access even though it is not as strong as the human interest pictures. It can be concluded that readers were attracted to access the news stories that had pictures, but were more attracted to access news with human interest pictures than news with information graphics when they were given real choices about order of access and the option not to read. In other words, access was not only influenced by the emotional elements in the human interest pictures but might also be influenced by readers' past experience dealing with this type of picture in news stories.

## **8.2 Retention and reading time**

The effect of picture category on retention was revealed in Experiments 2 and 3, whereas Experiment 1 showed a non-significant difference between the two picture categories. The reason might be due to the same picture being used on the display screen and in the news story in Experiment 1. It was revealed in



Experiments 2 and 3 that the use of different pictures on the display screens and in-text helped readers to remember the news stories better than the use of redundant pictures as in Experiment 1.

As expected from previous research described in Chapter 3, retention increased most with information graphics. However, the findings of Experiment 3 also revealed that news with human interest pictures helped readers to remember the news stories better than news without pictures. This finding confirmed that the addition of pictures in text would increase retention when compared to text only.

Also consistent with previous research, there was a significant difference in reading time between news with human interest pictures and news with information graphics in all three experiments. The analysis of time reading the text and time looking at the picture revealed that participants took about the same time reading the text but they took longer looking at information graphics than at human interest pictures. This indicates that news with information graphics fosters more total reading time than does news with human interest pictures. One possible reason why looking time increased in information graphics might be due to the complexity of the graphics. The fact that the more complex information graphics yielded longer self-exposure time than the human interest pictures suggests the possibility of “image specific”, the second image proposed by Sargent (2005). Consistent with previous findings (Zillmann, Knobloch & Yu, 2001; Knobloch, Hastall, Zillmann, & Callison, 2003; Sargent, 2005), exposure to

information graphics resulted in significantly longer self-exposure to that particular news story. This suggests that readers need more time to understand the picture because it has more elements. Time may also be needed to integrate the text and the graphic.

It seems reasonable to assume that there are differences in cognitive processes associated with understanding from the two different picture categories, human interest and information graphics. According to Noldy, Stelmack, & Campbell (1990), processing of pictures in the brain need “additional allocation of attention resources or effort”. Certainly information graphics, such as the bar graphs in the economic story, have more elements than a photo of Bill Gates in the same story. This suggests that the elements of the information graphics such as location maps, diagrams, and bar graphs, which contained additional information took longer to read and required greater in-depth processing as compared to the human interest pictures. Given the fact that participants took the time to study the text with information graphics, they should have been able to recall the content more accurately and in greater detail. The findings of Experiment 2 and 3 revealed significantly better information recall from news with information graphics as compared to news with human interest pictures.

The current findings also expand previous research (Ellis, Whitehill, & Irick, 1996; Sargent, 2005) who suggested that adding graphics can increase learning and retention if the graphics supplement the text in some meaningful way. The

present study has shown that this “supplementary” is more effective with the category of pictures here termed “information graphics” than with human interest pictures. It should be noted that in the present investigation especially in Experiments 2 and 3, the pictures used in the headline display were not repeated in the associated texts but they supplemented each other. This was done in the interest of the independent effects of in-display and in-text images. The pictures that were associated with headline displays, compared to pictures in the text of the articles, were expected to dominate the influence on access and to foster reading, which in turn might influence retention. In other words, the employment of non-redundant pictures in-display screen and in-text may be expected to secure continuing attention to the associated text and increased retention. In Experiment 1 the use of same picture in-display and in-text resulted in the same amount of retention for both picture conditions. One possible explanation for this unexpected finding is that when the pictures were repeated, readers did not bother to view them again in the context of the text. The significant difference between retention in news with human interest pictures and information graphics in Experiments 2 and 3 confirmed that non-redundant pictures were useful in helping readers to remember the news stories.

Taken together, unlike previous studies (e.g., Lang & Friestad, 1993; Newhagen & Reeves, 1992) who showed that visuals are remembered better in negative messages and in stories containing compelling visual images, the current study revealed that stories with information graphics were remembered better even

though the news story was not negative or compelling. This might suggest that the information graphics provided more information to readers, and that this in turn stimulated greater and more deliberate cognitive processing of the entire text.

### **8.3 Assessment of overall design**

The results of subjective ratings revealed that readers claimed they would be influenced to read news stories with pictures. They liked to have news stories with both human interest pictures and information graphics. This research shows that people have strong expectations for events portrayed in news photographs, events not often directly experienced by them. This suggests that people may have expectations for the overall look of news websites.

### **8.4 Theoretical implications**

On the theoretical side, this study provides challenges for the cognitive theory of multimedia learning (Mayer, 1997). That theory is based on three assumptions – the dual coding assumption, the limited capacity assumption, and the active learning assumption. The dual coding assumption does not make differential predictions for human interest and information graphic, and may underestimate the integration of text and graphics that seems apparent from these data. The limited capacity assumption has not been directly addressed in this study, but in so far as readers spent longer viewing the pictures if this increased demands on working memory there seemed no detrimental effects. The present findings

support the view that readers are active learners and process the news differently according to the pictures used in the news stories. News with information graphics was processed deeply in order to understand the messages as compared to news with human interest pictures. This process of active learning results in an integration of the picture and text, and hence in higher retention of news with information graphics as compared to news with human interest pictures.

Although the findings of this study support the dual coding theory that adding pictures to text is generally beneficial for learning, the dual coding theory does not take into account that a subject matter can be visualized in different ways. The theory should be able to predict what type of picture is beneficial for accessing and knowledge acquisition rather than use pictures in general. The findings of this study suggest that adding information graphics will result in better retention than adding human interest pictures to the same text.

### **8.5 Limitations and suggestions for future research**

It must be noted that the present study has limitations and is by no means exhaustive. First, although this study revealed that different types of pictures serve different purposes, it was limited to two types of graphics only, human interest and information graphics. It would be interesting in future research to investigate whether other types of pictures such as pictograms and cartoons may

have similar influence on access and retention as with human interest pictures and information graphics.

Second, the access and retention in this study were done with static pictures. Since the Internet allows animation and videos, it is worth investigating whether dynamic pictures have the same influence on access and retention as with static pictures. This is because studies have shown that the cognitive demands of integrating text and graphics appear to differ according to whether the graphic is static or dynamic (Peeck, 1987).

Finally, the current study only examined the news websites viewed on desktop monitors. Pictures may be too space-hungry to have similar effects on smaller screens, e.g., when online news is accessed through a Personal Digital Assistant (PDA) or watched on a smart phone. This issue will be examined in Chapter 9.

Although it may be too soon to establish any clear guidelines for the online news industry, the results of these experiments emphasize that in designing information that includes texts and pictures, the pictures should be considered carefully. The question is not only which information is to be conveyed, but one must also ask whether the picture will attract readers' attention and encourage them to access the information and at the same time help them to remember the news.

## 8.6 Conclusions

The current findings extend existing knowledge regarding the effects of pictures by demonstrating an effect of relatively neutral human interest picture on access and an effect of information graphics on retention of online news stories. The findings of this study provide evidence that different types of pictures influence readers in different ways and so can be used to serve different editorial purposes.

The present findings demonstrate that people are more likely to access online news stories if they incorporate human interest pictures and information graphics. Given the present findings, news editors should identify that the competition for access to text favors graphics as an essential accompaniment of text, and that the employment of human interest pictures is therefore imperative. Readers will not return to websites that do not transmit information effectively. One element that might enhance the effectiveness of news websites is more pictures. From the analysis of co-varying factors in Experiment 3, it seems to be the picture, not the story location and news content, that is the more powerful indicator of when a news story will be accessed.

The current findings suggest that as a way to attract readers to access and read the news, it would probably be beneficial for news providers to incorporate more human interest pictures in the headlines of the stories rather than simply give the headlines only. This is also parallel with Hong, Thong and Tam's (2004)

suggestion that providing product images together with the brand names on the product listing pages is more efficient and effective than just displaying the brand names alone.

The findings also suggest that the human interest pictures would enhance retention, even though not as much as information graphics. This indicates that a news story, which includes a picture will motivate readers to recall better than news without pictures. Wyer & Srull (1986) suggested that motivations are what drive the processing of information. They may be of many different types, such as a desire to recognize, understand, evaluate, or make a decision. And in the case of this study, the human interest pictures motivated readers to process and understand the news better than the text without pictures, and as a consequence enhanced their retention.

Overall, the findings illustrate the need of news websites to vary the use of graphics in order to attract readers to access and at the same time remember the news stories. By using attractive and vivid pictures together with informative graphics, news websites may in turn make the reading experience for readers more enjoyable and memorable. Using pictures in news stories is at least not harmful, but can be very helpful. This is true especially for the use of human interest pictures and information graphics.



## CHAPTER NINE

### THE ROLE OF PICTURES IN FUTURE ONLINE NEWS STORIES

#### 9.0 The future of online journalism

The development of technology and multimedia will dictate the development of online journalism. As a new digital media that has changed rapidly since the introduction and development of the Internet and World Wide Web, the Internet not only contains all the capabilities of the older media (text, images, graphics, animation, audio, video) but offers a broad range of new capabilities, including interactivity, on-demand access, user control, and customization (Pavlik, 2001, p. 3). Interactivity, which is defined as “the extent to which users can participate in modifying the form and content of a mediated environment in real time” (Steuer, 1995, p. 46) indicates that users have control over the events in the process of their interaction.

This situation creates debate on the future of online journalism that focuses on whether it will replace traditional media or continue to complement them. Recent findings indicate that the use of the Internet and computers does not displace print media or the use of broadcasting (Adoni & Nossek, 2001; Ferguson & Perse, 2000). Using the Internet with its relatively active ways of information seeking and message exchange is not functionally equivalent to watching

television or listening to the radio as a consumption of information and a relaxing pastime. Neither is it equivalent to reading printed material in a comfortable environment. To many people, it may look like the Internet is becoming the central medium connecting and even swallowing all others. Boynton (2000, p. 29) suggests there will be further blurring between the mediums but that online journalism will supplement traditional mediums rather than replace them. While the future is not completely clear, it is certain that the online medium will continue to grow and prosper as technology improves and the medium is further understood and embraced. Whether print or online, the journalist still carries the social responsibility to serve as a watchdog on government, and to provide the information and analysis that society needs.

### **9.1 Technical developments**

As technologies continue to evolve, it will be increasingly possible, technically, to use ever more complex media, including multimedia to deliver news stories. As Oliver (1994, p. 169) notes, the term multimedia has not always designated computer-based media, but originally referred to combinations of audio, visual, and print materials. Now, however, the term multimedia has been adopted by the computer industry and re-defined to mean 'the integration of video, audio, graphics, and data within a single computer display device'. This integration would enable editors to present many more pictures in online news stories as compared to the traditional print medium. The implications of these will be discussed below.

The invention of new technology has slowly changed the way readers' access the news stories. For example, the new mobile devices such as Personal Digital Assistants (PDA), smart phones, 3G phones, etc, make other possibilities for people to keep informed while they are on the move. One of the latest media devices is PDA on the wrist proposed by British Telecom (Solymar, 1999, p.293). The device will be the size of a digital wristwatch but it will be able to do a lot more than an ordinary watch. It could act as a telephone so one can talk into it. It could act as a videophone, so the image of the person at the other end of the line would also appear. In addition the screen might unfold and this screen could be used for accessing the Internet, sending fax or email, or performing a number of other functions like contacting the emergency services, banks, etc., or might simply provide television programmes. This new device gives a new way to disseminate information within a small display screen.

However, on a small screen device with space constraints such as on a PDA, the pages can be hard to read. The presentation of information at any one time is possibly limited either to text or a picture. If presented by text, it may be in a non-linear form, i.e., broken into sections that people jump to. The non-linear form enables readers to scan and select which stories they wish to read and ignore the rest. This differs from television and radio broadcasts where all stories are presented and ordered according to the choices of news editors. Readers' access to picture is either by marginal buttons or from highlighted text (i.e., here access is chosen by the reader) or delivered without choice (e.g., as 'next page')

chosen by the editor). Unexplored has been the issue of whether people will access pictures, which could improve their understanding of the news stories. Although display space is limited, storage space is not; so readers could be offered access to many more pictures than is feasible in printed media.

Although the new devices have small screens and may be dominated by text, their potential in delivering visual information has attracted many media organizations. For example, Opera Software ASA, one of the world leaders in the development of web browser technology, has finally cracked the screen size problem that has plagued and stopped the full-scale implementation of the full Internet onto small mobile devices. Opera's engineers have managed to reformat existing HTML web sites to fit on small screens, while maintaining Opera's small size and low resource consumption, making the full Internet now an option on mobile phones. Opera's breakthrough has been met with enthusiasm from the wireless industry, and work is progressing on several business deals (<http://www.mobiletechnews.com/info/2002/10/16/192040.html>). In due course this may well influence the design of online news stories.

The potential of video or film on small screens is evident from the interest in filmmaking with mobile phones as presented in the Pocket Film Festival in France (2005). Festival director Laurence Herzberg said that filmmaking with mobile phones was starting to be taken more seriously, pointing out that three other film festivals had asked her to loan them some of the works from the

Pocket Festival and that several French film schools were adding the format to their courses (<http://www.physorg.com/news7083.html>). Herszberg rejected suggestions that mobile phone films were merely a gimmick, pointing out that, for example, digital movie cameras were at first scorned by serious filmmakers but have now been widely accepted.

## **9.2 Rhetorical changes**

The above two examples showed that although small devices have space constraints, the limitations did not prevent media organizations from using pictorial information. In fact, they were encouraged to show that the small devices provide an alternative way for readers to access the latest information via smart phone or PDA. The pictures as 'attractors' may function differently on desktop or home TV screens where several texts can be scanned, compared to small screens such as in mobile devices where access would be sequential. So readers may prefer a textual list because it is easier to scan quickly, but they could have thumbnails on larger desktop or home TV screens. This means that the space limitations do not constrain news providers to use text only but instead, they can present the information with visual elements too. However, space constraints may result in some rhetorical changes with implications for journalism's current inverted pyramid and the headlines of the news stories.

### **9.2.1 Implications for journalism's current inverted pyramid**

In reporting news, journalists use an inverted pyramid style by telling the most newsworthy information at the top, and then the remaining information follows in order of importance, with the least important at the bottom (Mencher, 2003, p.143). The triangle's broad base at the top of the figure represents the most substantial, interesting, and important information the writer means to convey. Normally, this stage provides the answer of 5W 1H, i.e., who, what, where, when, why and how, that is always used in news reporting (Itule & Anderson, 2003, p. 74). The triangle's orientation is meant to illustrate what kind of material should head the article. The tapered lower portion illustrates that other material should follow in order of diminishing importance. This format will allow the less important information to be more easily cut out of the article to fit a fixed size or space.

Inverted-pyramid writing is useful for newspapers because readers can stop at any time and will still get the most important parts of the article. On the Internet, the inverted pyramid becomes even more important because journalists can use more pictures to make the news easily comprehensible to the readers. Since users get more experience with scrolling pages and scanning the text on the web, it is important to position main points at the beginning of the article with the human interest pictures, then as readers go into more detail there would be need to incorporate the information graphics to clarify the news. As revealed in the current study, the human interest pictures would possibly appear at the higher levels as this type of picture can influence readers to foster reading. On the other

hand, the information graphics, which serve as a supplement to the text, would be placed at the lower levels in the text in order to give further explanation of the subject matters. This indicates that both types of pictures can be included in online news stories to make the news more memorable to readers. In printed media when pictures accompany news stories they bear no clear relation to the inverted pyramid structure.

### **9.2.2 Headlines**

The job of presenting information in small spaces will remain a challenging task. Although people browsing the web are looking for information, they are also very impatient. Therefore most people will only scan the content; they won't read it. One way of scanning the content is through headlines. With the small screen limitation, the new media devices can deliver only 40 to 60 characters at a time. The requirements for online headlines are very different from printed headlines because they are used differently. According to Nielsen (1998), the two main differences in headline use are:

a) Context of headline displayed

Online headlines are often displayed out of context: as part of a list of articles, e.g., the news index available via TV teletext. So users don't get the benefit of applying look ahead to the interpretation of the headline.

b) Ways of reading

Even when a headline is displayed together with related content, the difficulty of reading online and the reduced amount of information that can be seen in a

glance make it harder for users to learn enough from the surrounding data. In print, a headline is tightly associated with photos, subheads, and the full body of the article, all of which can be interpreted in a single glance. When online, a much smaller amount of information will be visible in the window, and even that information is harder and less pleasant to read, so people often don't do so.

Because of these two differences, the online headline has to stand on its own and make sense when the rest of the content is not available. Sure, users can click on the headline to get the full article, but they are too busy to do so for every single headline they see on the web.

### **9.3 Pictures or videos?**

The increasing use of imagery in online news – in comparison with that in printed news has become part and parcel of what has been labeled the iconization of the worldview (Zillmann, 1997). Digital technology makes it possible to distribute news to readers through the use of videos, which integrated pictures with sound. A video may contribute little more information than a static picture. Therefore, the issue about whether “readers” may become “listeners” is another point to consider when designing news for mass audience. For example, if on a train, people may prefer to watch and listen but not to read. They may find watching and listening to video in their small devices is something enjoyable. Reading a newspaper or any other written news publication requires more attention than watching TV news.



Although TV news offered the options of pictures and sound to the viewers, the news content was present in a package. People did not have any control over the content. In contrast, video presented in an online medium gives readers freedom to integrate information in their own preferred order. Readers can search for the information they need, select what to read from that pool of information, choose the best order to read it, and then put their own text together as a coherent story. This is the added value that was not provided by the TV news but can be seen as a feature of online media that distinguish the new media from the old.

#### **9.4 Conclusion**

The invention of new technology in disseminating news, especially the small devices such as PDA and smart phones have several implications. The introduction of new gadgets shows the diversity of distributing news in the digital age. The print medium is unlikely to disappear but will serve as a supplement to the new medium. This option of print, TV and online medium will enable readers to choose what sort of information they access and from what sort of devices. Undoubtedly further research investigating the effects of different media on readers' information seeking and understanding will be needed.

Additionally, the new interactive technologies provide an alternative format for large and small screens. This suggests that news providers have several different formats for disseminating news to readers. Whether format conversion can be automated will be an issue for the future.

Pictures, as a significant part of the overall package of online news have a variety of influential roles that they can play. This thesis has shown different kinds of pictures serve different roles in attracting and assisting readers. The human interest pictures played a prominent role in attracting readers to access and read the news stories, while the information graphics enhanced readers' retention of the news stories. These roles will both evolve and persist in future online newspapers.

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**APPENDIX A**  
**QUESTIONNAIRE**

Ref. code: \_\_\_\_\_

**PART A: Hernia story**

***Instructions: Please circle the letter in front of your answer.***

1. What is the title of the news story?
  - a. Deadly hernia corrected in womb
  - b. Hernia corrected in womb
  - c. Deadly hernia detected in womb
  - d. Hernia detected in womb
  - e. Didn't read that part
  
2. Who developed the new medical technique?
  - a. Professor Kypros Nicolaidides
  - b. Professor Kypros Nicholas
  - c. Professor Steward Campbell
  - d. Professor Stuart Campbell
  - e. Didn't read that part
  
3. In which part of the organ does the hernia occur?
  - a. From a small hole remains in the lung.
  - b. From a small hole remains in the diaphragm.
  - c. From a small hole remains in the liver.
  - d. From a small hole remains in the heart.
  - e. Didn't read that part
  
4. What is inserted in the windpipe during the operation?
  - a. Needle
  - b. Tube
  - c. Fluid
  - d. Air balloon
  - e. Didn't read that part
  
5. When is the suitable time to insert the thing?
  - a. When the foetus is at 6 weeks of development.
  - b. When the foetus is at 16 weeks of development.
  - c. When the foetus is at 26 weeks of development.
  - d. When the foetus is at 36 weeks of development.
  - e. Didn't read that part.

6. When is the inserted thing removed from the baby's windpipe?
  - a. Four weeks before birth
  - b. Four weeks after birth
  - c. Two weeks before birth
  - d. Two weeks after birth
  - e. Didn't read that part
  
7. What is the chance of babies at risk surviving after undergoing the surgery?
  - a. 40-50%
  - b. 50-60%
  - c. 60-70%
  - d. 70-80%
  - e. Didn't read that part.

**PART B:**

***Please circle the number that corresponds to your personal feelings toward the picture and text about the hernia story.***

**The picture:**

8. Is attractive	5	4	3	2	1	Is not attractive
9. Is vivid	5	4	3	2	1	Not at all vivid
10. Is informative	5	4	3	2	1	Not at all informative
11. Helps clarify the content	5	4	3	2	1	Does not clarify the content

**The text:**

12. Is easy to understand	5	4	3	2	1	Difficult to understand
13. Is well written	5	4	3	2	1	Not well written
14. Is clearly organized	5	4	3	2	1	Not clearly rganized
15. Creates many images to mind	5	4	3	2	1	Creates a few images to mind
16. Is interesting	5	4	3	2	1	Not interesting

**PART C: Marine reserve story**

***Instructions: Please circle the letter in front of your answer.***

17. What is the name of the country that owned this marine reserve?
- Indonesia
  - Australia
  - New Zealand
  - Africa
  - Didn't read that part
18. Names of two islands involved as the marine reserve.
- Head and McDonald Islands
  - Heard and McDonald Islands
  - Heard and Macquarie Islands
  - McDonald and Macquarie Islands
  - Didn't read that part
19. Names of two oceans that surround these two islands.
- Indian and Southern Ocean
  - Indian and Pacific Ocean
  - Indian and South Atlantic Ocean
  - Indian and South Pacific Ocean
  - Didn't read that part
20. Where is the location of this marine reserve?
- South-east Australia
  - South-west Australia
  - West Australia
  - South Australia
  - Didn't read that part
21. What is the title of the news story?
- Australia to create biggest marine reserve
  - Australia to create largest marine reserve
  - Biggest marine reserve in Australia
  - Largest marine reserve in Australia
  - Didn't read that part
22. Who is Australia's Environment Minister?
- Daniel Kemp
  - Daniel Kent
  - David Kent
  - David Kemp
  - Didn't read that part

23. What is the name of the active volcano, which is also Australia's tallest mountain?
- Big Bob
  - Big Ben
  - Big Bean
  - Big Bill
  - Didn't read that part

**PART D:**

***Please circle the number that corresponds to your personal feelings toward the picture and text about the marine reserve story.***

**The picture:**

- |                               |   |   |   |   |   |                              |
|-------------------------------|---|---|---|---|---|------------------------------|
| 24. Is attractive             | 5 | 4 | 3 | 2 | 1 | Is not attractive            |
| 25. Is vivid                  | 5 | 4 | 3 | 2 | 1 | Not at all vivid             |
| 26. Is informative            | 5 | 4 | 3 | 2 | 1 | Not at all informative       |
| 27. Helps clarify the content | 5 | 4 | 3 | 2 | 1 | Does not clarify the content |

**The text:**

- |                                 |   |   |   |   |   |                            |
|---------------------------------|---|---|---|---|---|----------------------------|
| 28. Is easy to understand       | 5 | 4 | 3 | 2 | 1 | Difficult to understand    |
| 29. Is well written             | 5 | 4 | 3 | 2 | 1 | Not well written           |
| 30. Is clearly organized        | 5 | 4 | 3 | 2 | 1 | Not clearly organized      |
| 31. Creates many images to mind | 5 | 4 | 3 | 2 | 1 | Creates few images to mind |
| 32. Is interesting              | 5 | 4 | 3 | 2 | 1 | Not interesting            |

**PART E: Murder story**

***Instructions: Please circle the letter in front of your answer.***

33. Where is the first place that the suspect goes before being captured?
- Furniture store
  - Food store
  - Garage
  - Bank
  - Didn't read that part

34. Where is the place that the suspect is captured?

- a. Near furniture store
- b. Near food store
- c. Near garage
- d. Near bank
- e. Didn't read that part

35. What is the title of the news story?

- a. Murders suspect stays in hospital
- b. Murders suspect arrests in hospital
- c. Suspect stays in hospital
- d. Suspect arrests in hospital
- e. Didn't read that part

36. Who is the suspect?

- a. Mark Hobson
- b. Mark Hudson
- c. Mike Hobson
- d. Mike Hudson
- e. Didn't read that part

37. Who is the owner of the garage?

- a. Barrack North
- b. Derrick North
- c. James North
- d. John North
- e. Didn't read that part

38. Who is the suspect's girlfriend?

- a. Claire Sanderson
- b. Clare Sanderson
- c. Diane Sanderson
- d. Deanne Sanderson
- e. Didn't read that part

39. Names of twin sisters that were killed by suspect.

- a. Clara and Diane Sanderson
- b. Clara and Deanne Sanderson
- c. Claire and Deanne Sanderson
- d. Claire and Diane Sanderson
- e. Didn't read that part



**PART F:**

***Please circle the number that corresponds to your personal feelings toward the picture and text about the murder story.***

**The picture:**

40. Is attractive	5	4	3	2	1	Is not attractive
41. Is vivid	5	4	3	2	1	Not at all vivid
42. Is informative	5	4	3	2	1	Not at all informative
43. Helps clarify the content	5	4	3	2	1	Does not clarify the content

**The text:**

44. Is easy to understand	5	4	3	2	1	Difficult to understand
45. Is well written	5	4	3	2	1	Not well written
46. Is clearly organized	5	4	3	2	1	Not clearly organized
47. Creates many images to mind	5	4	3	2	1	Creates few images to mind
48. Is interesting	5	4	3	2	1	Not interesting

**PART G: Microsoft story**

***Instructions: Please circle the letter in front of your answer.***

49. What is the title of the news story?
- a. Giving \$75 billion back, with plenty to spare
  - b. Giving money back, with plenty to spare
  - c. Giving \$75 billion back to share holders
  - d. Microsoft giving \$75 billion back
  - e. Didn't read that part
50. What are the companies being compared in the story?
- a. Microsoft, IBM and Hewlett Packard
  - b. Microsoft and Hewlett Packard
  - c. Microsoft and IBM
  - d. IBM and Hewlett Packard
  - e. Didn't read that part.

51. How much money will Microsoft spend on special dividend, which expected to be given in early December?
- \$9 billion
  - \$19 billion
  - \$29 billion
  - \$32 billion
  - Didn't read that part
52. Microsoft abandoned its proposed acquisition of Intuit, a maker of personal-accounting software, after a lawsuit from the Justice Department in which year?
- 1995
  - 1996
  - 1986
  - 1985
  - Didn't read that part
53. Who is the Microsoft's chief executive?
- Steve Ballmer
  - Steve Palmer
  - Stephen Ballmer
  - Stephen Palmer
  - Didn't read that part.
54. What Microsoft has done in order to change its image?
- Give dividend to its shareholders.
  - Donation of \$3 billion dividend from Gates.
  - Give dividend and donation from Gates.
  - Emerging with other large companies such as SAP, a German firm.
  - Didn't read that part
55. What is the highest amount of cash and short-term investment for Microsoft?
- Over \$40 billion
  - Over \$50 billion
  - Over \$60 billion
  - Over \$70 billion
  - Didn't read that part

**PART H:**

***Please circle the number that corresponds to your personal feelings toward the picture and text about the Microsoft story.***

**The picture:**

56. Is attractive	5	4	3	2	1	Is not attractive
57. Is vivid	5	4	3	2	1	Not at all vivid
58. Is informative	5	4	3	2	1	Not at all informative
59. Helps clarify the content	5	4	3	2	1	Does not clarify the content

**The text:**

60. Is easy to understand	5	4	3	2	1	Difficult to understand
61. Is well written	5	4	3	2	1	Not well written
62. Is clearly organized	5	4	3	2	1	Not clearly organized
63. Creates many images to mind	5	4	3	2	1	Creates few images to mind
64. Is interesting	5	4	3	2	1	Not interesting

**PART I:**

*In questions 65 through 70, please circle the number that corresponds to your personal feelings toward the overall design of the news stories that you have read.*

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
65. I like newspaper articles that have pictures.	5	4	3	2	1
66. I was influenced to read the story by the human interest pictures.	5	4	3	2	1
67. I was influenced to read the story by the information graphics.	5	4	3	2	1
68. I wish more news material used information graphics.	5	4	3	2	1
69. I wish more news material used human interest pictures.	5	4	3	2	1
70. I wish more news material used combinations of information graphics and human interest pictures.	5	4	3	2	1

**PART J:**

**Please tick one answer for each of the following questions.**

71. How much did you previously know about the material covered in the articles?  
*A great deal* *Nothing at all*

Health	5	4	3	2	1
Science/Nature	5	4	3	2	1
Crime	5	4	3	2	1
Economics	5	4	3	2	1

72. If yes, where else have you heard this news (tick all that apply).

News website     Newspaper     Television     Radio  
Others: \_\_\_\_\_ (specify)

73. How often do you read on the web (other than e-mail) in a week?

Several times a day     Once a day     Once every 2 or 3 days  
 Once a week     Never

74. How much time do you spend browsing the Internet for information in a week?

0-3 hours     4-8 hours     9-12 hours     More than 12 hours

75. How often do you read printed newspapers?

Very often     Often     Sometimes     Rarely  
 Never

76. How often do you watch TV news?

Very often     Often     Sometimes     Rarely  
 Never

77. Please rate your web experience level.

0-2 years     3-5 years     6-8 years     More than 8 years

78. Please rate your comfort with reading news articles on the computer.

Very comfortable     Comfortable     Uncomfortable  
 Very uncomfortable

79. Please rate your comfort with clicking links to get information.

Very comfortable     Comfortable     Uncomfortable  
 Very uncomfortable

80. What is your gender?  Male     Female

81. What is your age? \_\_\_\_\_ years

82. Is English your first language?     Yes     No

83. What is your enrollment status at Cardiff University?

BA       MA       PhD

Other: \_\_\_\_\_ (specify)

*Thank you for completing this questionnaire.*

**APPENDIX B**  
**CONSENT FORM**

I understand that my participation in this experiment will involve reading several online news stories and completing a multiple-choice questionnaire about my opinions on several types of online news story, which will require approximately 30 minutes of my time.

I understand that participation in this study is entirely voluntary and that I can withdraw from the study at any time without giving a reason.

I understand that I am free to ask any questions at any time by raising my hand. If for any reason I experience discomfort during participation in this experiment, I am free to withdraw or discuss my concerns with Normah Mustaffa.

I understand that the information provided by me will be held anonymously, so that it is impossible to trace this information back to me individually. I understand that, in accordance with the Data Protection Act, this information may be retained indefinitely.

I also understand that at the end of the study I will be provided with additional information about the study.

I, \_\_\_\_\_ consent to participate in the study conducted by Normah Mustaffa, Cardiff School of Journalism, Media and Cultural Studies, Cardiff University with the supervision of Prof. Patricia Wright.

Signed: \_\_\_\_\_

Date: \_\_\_\_\_

## APPENDIX C

### DEBRIEFING NOTES

Thank you for your participation in this study. This study is investigating the influence of pictures on accessing and remembering online news stories by readers. The pictures varied at different workstations, but all participants had two human interest pictures and two information graphics.

This study explores whether human interest pictures will attract readers to read the story, while the information graphics will help readers to understand and recall the content of the story.

If you have any queries or comments, you are welcome to contact either me or my supervisor.

**Researcher:**

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## APPENDIX D

### INSTRUCTION FOR EXPERIMENT 1

**Position Code:** \_\_\_\_\_

1. Please log on to the network by using your username and password.
2. Immediately double click on **"My computer"**; click on **"G"** drive and look for **"News Sample"**.
3. Click on a file titled **"FrontpageA1"**.
4. Please fill in the blanks below to indicate your reading activities. The front page shows stories in the four portions labeled A, B, C, D.

A	B
C	D

If you had a choice about the order in which you read these stories, please write down the letter to show this order: 1<sup>st</sup>: \_\_\_\_\_; 2<sup>nd</sup>: \_\_\_\_\_; 3<sup>rd</sup>: \_\_\_\_\_; 4<sup>th</sup>: \_\_\_\_\_.

At this station, there is no choice. Please press the button for the first story. Using the clock at the bottom right of the screen, please note down your start and finishing time for each story. Circle on the 5-point scale ranging from 5 (e.g. is very interesting) to 1 (e.g. is very boring) to indicate your assessment of the journalistic style (language, layout, content, etc) of the story. Then repeat this for the other three stories by clicking the Next Story button.

Please circle the story topic	Start Reading	Finish Reading	Journalistic style				
Health   Nature   Crime   Economics	_____	_____	5	4	3	2	1
Health   Nature   Crime   Economics	_____	_____	5	4	3	2	1
Health   Nature   Crime   Economics	_____	_____	5	4	3	2	1
Health   Nature   Crime   Economics	_____	_____	5	4	3	2	1

5. When you have finished reading all four stories, close the Internet Explorer browser. (Note: Once you close the browser, you may not reopen it, so make sure that you are finished or have read all the stories.



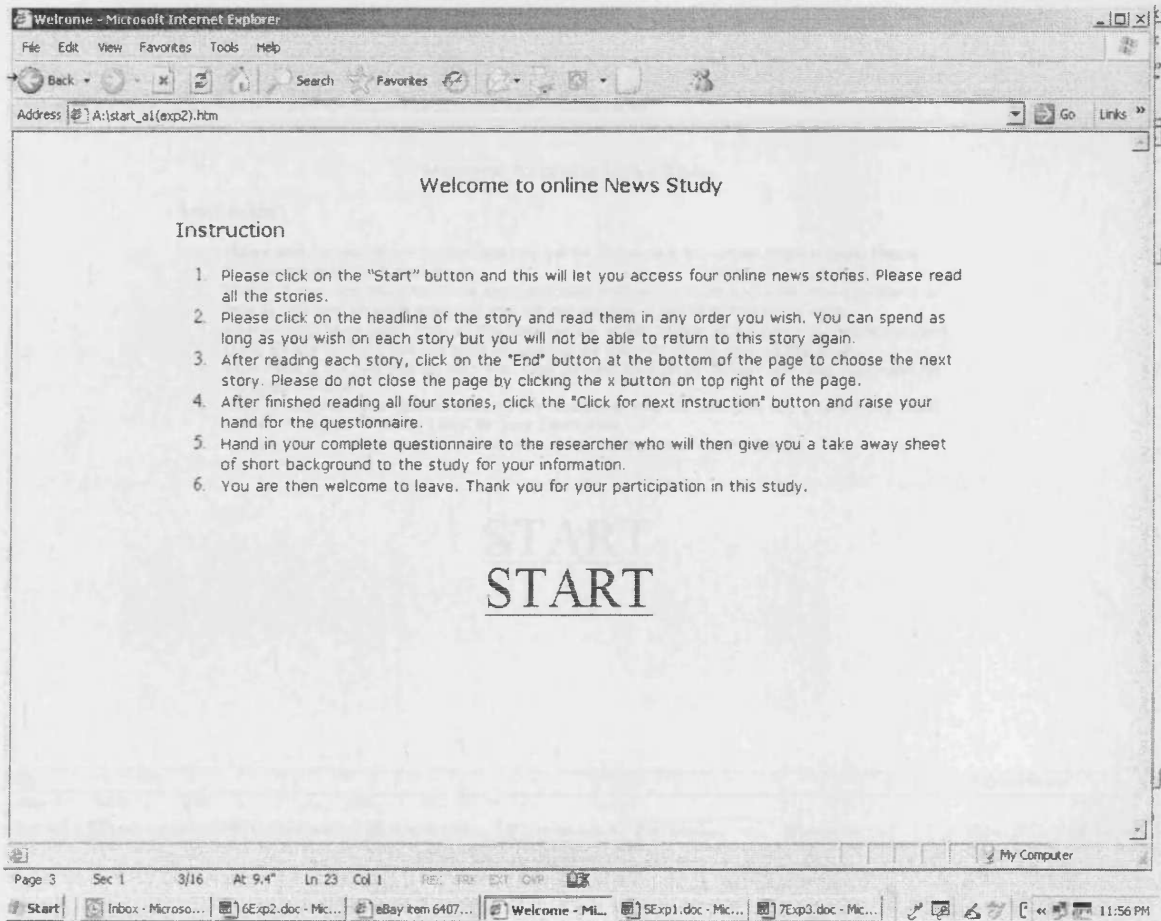
6. Raise your hand to signal your readiness for the questionnaire about the stories.
7. When you have filled the questionnaire, hand in this instruction sheet and questionnaire to the researcher who will then give you a take away sheet of short background to the study for your information.
8. You are then welcome to leave. Thank you for your participation in this study.

**Note:**

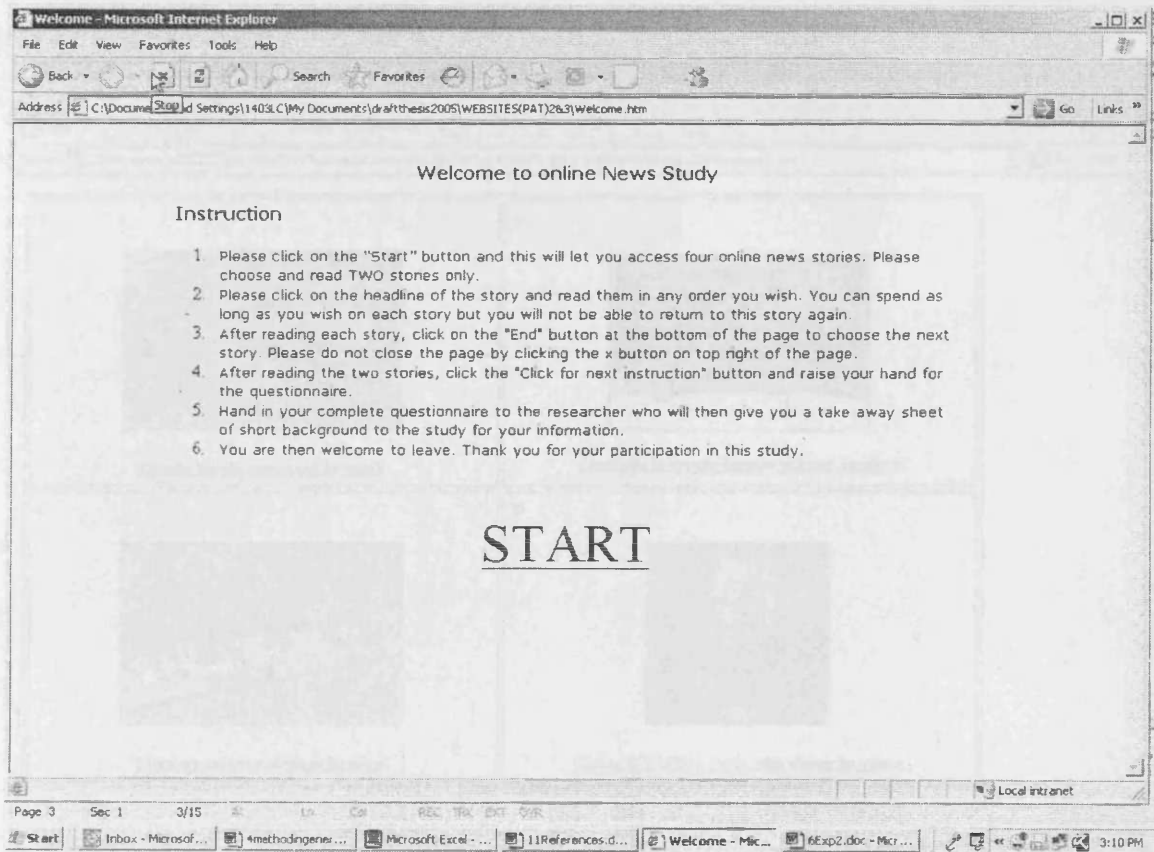
This sheet shows the instruction for Group 1 in ABCD order; the only difference between the instruction sheets for Group 1, Group 2 and Group 3 was the frontpage. Participants in Group 1 were instructed to read a file titled "FrontpageA1"; participants in Group 2 read "FrontpageA2" and participants in Group 3 read "FrontpageA3". In BDAC order, Group 1 read "FrontpageB1", Group 2 read "FrontpageB2" and Group 3 read "FrontpageB3". There were "FrontpageC1", "FrontpageC2" and "FrontpageC3" for DCBA order; and "FrontpageD1", "FrontpageD2" and "FrontpageD3" for CADB order.

## APPENDIX E

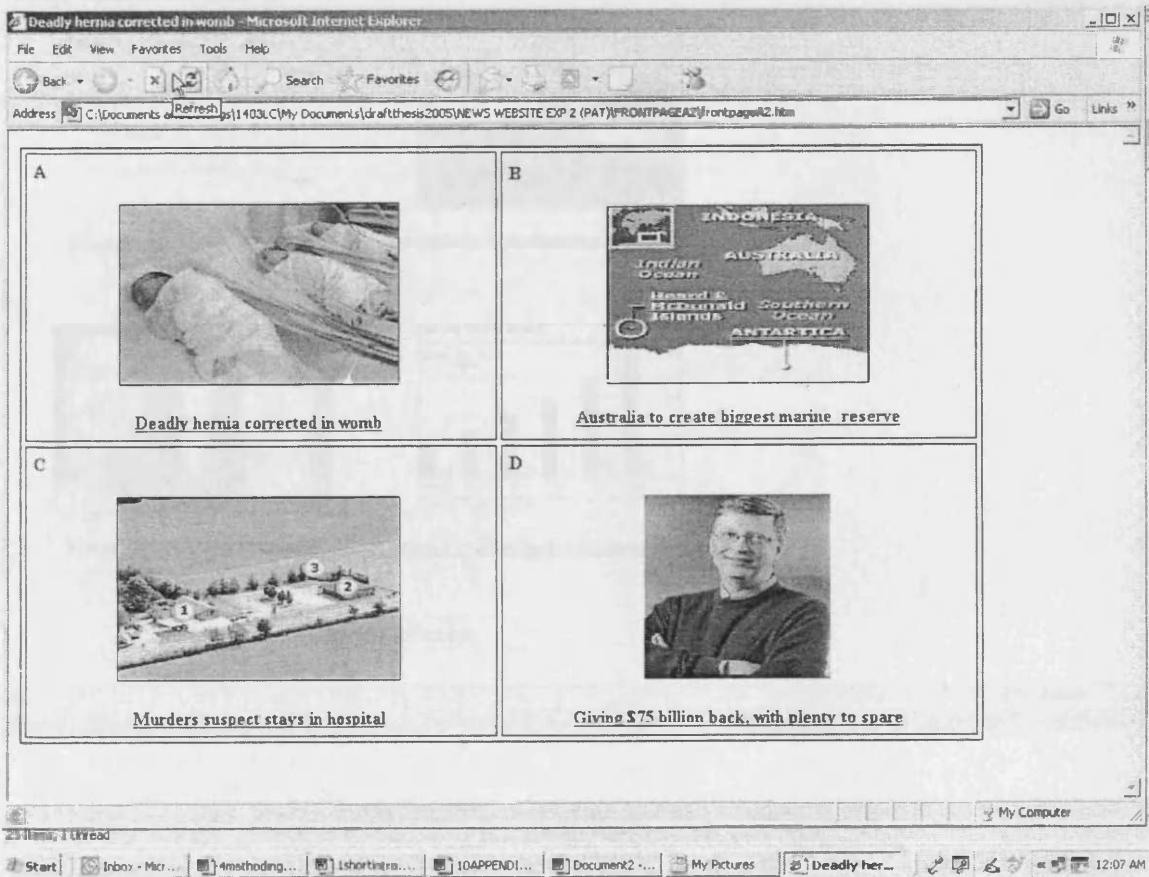
### INSTRUCTION FOR EXPERIMENT 2



**APPENDIX F**  
**INSTRUCTION FOR EXPERIMENT 3**



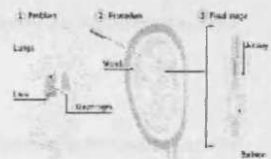
APPENDIX G  
DISPLAY SCREENS




Deadly hernia corrected in womb - Microsoft Internet Explorer

File Edit View Favorites Tools Help


Address <A:\FRONTPAGE1\frontpage1.htm> Go Links



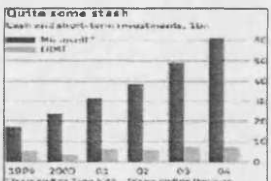
[Deadly hernia corrected in womb](#)



[Australia to create biggest marine reserve](#)



[Murders suspect stays in hospital](#)

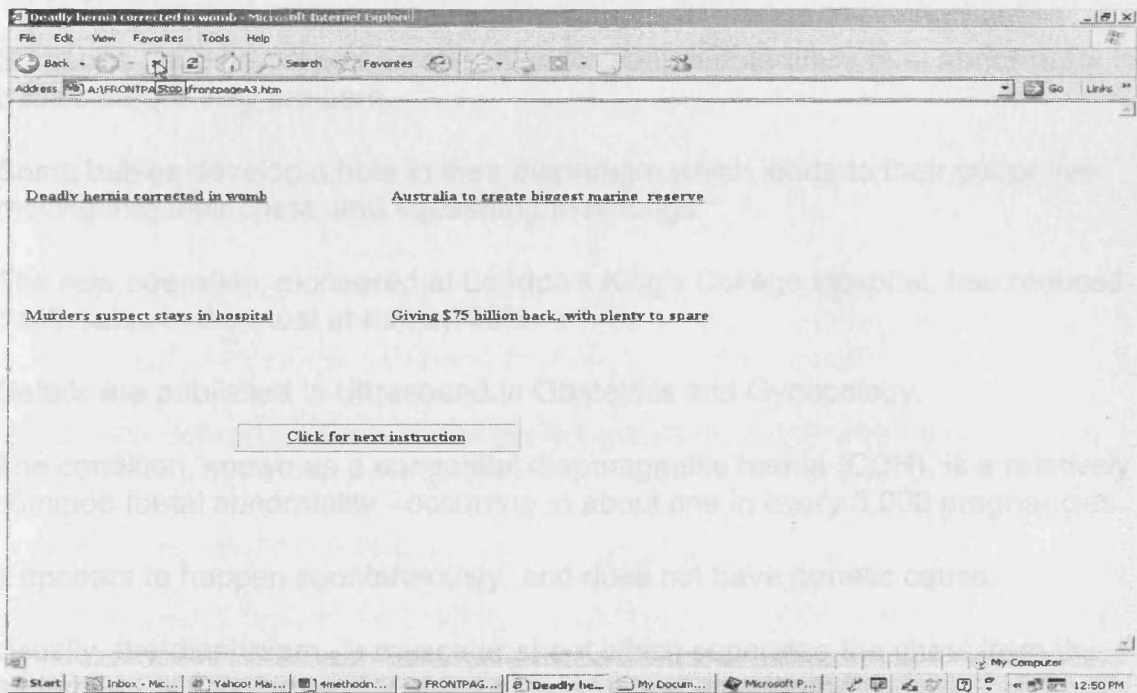


[Giving \\$75 billion back, with plenty to spare](#)

[Click for next instruction](#)

Start | Inbox - Mic... | Yahoo! Mail... | 4methodr... | FRONTPAG... | Deadly hc... | My Docum... | Microsoft P... | My Computer | 12:10 PM

## APPENDIX N HEALTH NEWS



## APPENDIX H

### HEALTH NEWS

#### **Deadly hernia corrected in womb**

Surgeons have developed an operation to repair a potentially fatal abnormality in babies before they are born.

Some babies develop a hole in their diaphragm which leads to their gut or liver moving into their chest, and squashing their lungs.

The new operation, pioneered at London's King's College Hospital, has reduced death rates in the most at risk by 50%.

Details are published in *Ultrasound in Obstetrics and Gynecology*.

The condition, known as a congenital diaphragmatic hernia (CDH), is a relatively common foetal abnormality - occurring in about one in every 3,000 pregnancies.

It appears to happen spontaneously, and does not have genetic cause.

Usually, the diaphragm - a muscular sheet which separates the chest from the abdomen - is fully formed by about nine weeks of development.

But in this condition, a small hole remains, and as the foetus develops the contents of the abdomen, the gut or the liver, force their way through the gap, and up into the chest.

This a problem because, unlike the abdomen, which can expand, the chest is a boney box.

Therefore, when the gut contents enter the chest cavity they compress the lung tissues, and prevent them from developing properly.

As a result, around 50% of babies born with the condition cannot breathe properly, and die.

The new technique is designed for those babies most at risk.

It has been developed by Professor Kypros Nicolaides, at King's, in collaboration with doctors at University Hospital Gasthuisberg, Leuven, Belgium, and Vall d'Hebron Hospital, Barcelona.

### **Blocking the windpipe**

The operation, known as fetoscopic tracheal occlusion, involves inserting a balloon down the foetal windpipe when the foetus is at around 26 weeks of development.

This stops fluid generated in the lungs from escaping into the mouth, and out into the amniotic fluid surrounding the developing baby.

The fluid contains chemicals which stimulate growth of the lung tissue, and provides vital nutrients to speed the process.

Blocked from leaving the lungs in the normal way, the fluid stimulates the lung tissue to develop to such an extent that it begins to expand, and eventually to push the gut contents back through the hole in the diaphragm.

Initially, the balloon was removed from the baby's windpipe when the child was born, but the surgeons have now switched to a policy of removing it about a month before full term. This allows the child to be born naturally, rather than through a Caesarean section.

Professor Nicolaides told BBC News Online that three of the first 10 babies who underwent the surgery survived, but the six of the next 11 pulled through.

He is confident that 60-70% of babies most at risk will now survive after undergoing surgery.

He said: "This focuses on an important aspect of foetal medicine which is not to do with searching for abnormalities in order to destroy foetuses, but to diagnose them as early as possible and to develop minimally invasive procedures to correct them."

Professor Stuart Campbell, Editor of Ultrasound in Obstetrics and Gynaecology, said: "This relatively common foetal abnormality can be devastating to parents who until now could be offered little hope that their babies would survive.

"With the help of better scanning techniques we can accurately diagnose most foetal anomalies and we are now moving into the next phase where some of the abnormalities can be successfully treated in the womb."



## **APPENDIX I**

### **SCIENCE/NATURE NEWS**

#### **Australia to create biggest marine reserve**

Australia is to create the world's largest marine reserve.

The Heard Island and McDonald Islands Marine Reserve - 4,000 kilometres (2,485 miles) off the south-west coast - will be twice the size of Switzerland and will protect one of the world's most unspoilt environments from exploitation.

A number of important species live in the freezing Antarctic waters, including the endangered southern elephant seal and the sub-Antarctic fur seal.

The conservation group World Wide Fund for Nature says it plans to nominate the Australian Government for the Gifts to the Earth Award - its highest recognition for conservation.

BBC science writer Corinne Podger says that no foreign species have yet been introduced to the two islands and no commercial fishing is carried out there.

The region was put on the World Heritage List five years ago but the Australian Government's move to make it a fully protected national park will officially ban fishing, as well as oil and mineral exploitation.

Even scientific research will be limited.

#### **Climate monitored**

Australia's Environment Minister, David Kemp, said dozens of species of plants, birds and mammals would be protected.

"The declaration would preserve for science, and for nature, a very large area of one of the most pristine environments left on Earth," he said.

Mr Kemp said the reserve would also allow researchers to monitor the effects of climate change and pollution.

A group of the world's leading marine scientists has previously called for 20% of the world's oceans to be turned into protected marine reserves to save large numbers of fish and other species from the threat of extinction.

The size of the new park at 6.5 million hectares (16 million acres) surpasses Australia's Macquarie Island reserve at 5.8 million hectares (14.3 million acres) about 1,500 km (930 miles) off Australia's south-east tip.

Heard Island has Australia's only active volcano, Big Ben, which is also the country's tallest mountain, rising 2,745 metres (9,006 ft) above snow and glacial ice. The island is home to vast numbers of penguins and seals.

McDonald Island has such a steep coastline that only two successful landings have been made by boat since it was discovered more than a century ago.

Mr Kemp described the islands as "the wildest place on Earth - a smoking volcano under a burden of snow and glacial ice rising above the world's stormiest waters".

Two species of the albatross will be protected in the new reserve.

The seas contain soft corals, glass sponges, giant barnacles and endangered species including the Patagonian toothfish, also known as Chilean sea bass, which is prized in restaurants in Japan, North America and Europe.

The Australian Government estimates that poachers harvest more than 2,200 tonnes of the fish each month from southern waters.

## APPENDIX J

### CRIME NEWS

#### **Murders suspect stays in hospital**

Double murders suspect Mark Hobson is to spend a second night in hospital, officials have confirmed.

Mr Hobson has been undergoing treatment for dehydration and minor abrasions following his arrest on Sunday.

A week-long manhunt ended when a petrol station owner in North Yorkshire spotted him and tipped off police.

Detectives want to question the 34-year-old about the murders of twin sisters Claire and Diane Sanderson, and pensioners James and Joan Britton.

Gillian Neal, spokeswoman for Harrogate District Hospital confirmed Mr Hobson would remain there overnight.

She said he had made good progress throughout the day and described his condition as "comfortable".

He would have to be deemed "medically fit" before he could be questioned by police, she added.

He was apprehended after being spotted at JD North filling station in Shipton-by-Beningbrough by owner Derrick North, who raised the alarm.

Mr North, 81, who reopened his garage as normal on Monday, said: "It was roughly 2.30 yesterday afternoon and this chap came in the shop and I recognised him straight away with his earring, his hair, his nose and his scar.

"He bought a box of matches and a bottle of water and some cigarette papers and paid in change and then just went."

## **'Delighted' to help**

He said Robin Wilson from an upholstery shop next door then joined him and they decided together to call the police.

Mr North said he was "delighted" to help police. He said Mr Hobson looked as if he had been sleeping rough.

"I rather think he was about ready for giving himself up. He looked very tired, worn out."

When police arrived, they sealed off the street and arrested the father of one.

Police launched their hunt after the body of Mr Hobson's girlfriend, Claire Sanderson, 27, was discovered at the flat where the couple lived in Camblesforth, near Selby, a week ago.

Miss Sanderson's twin, Diane, was also found dead at the flat.

Later that day the bodies of pensioners James Britton, 80, and his wife Joan, 82, were found at their home in Strensall, about 20 miles away.

After Mr Hobson's arrest, it is understood he was taken first to a police station in North Yorkshire and later to hospital with an unspecified abdominal injury.

## **Church prayers**

Officers thanked the public for providing "magnificent" help during the course of their investigation.

Det Supt Javad Ali, who led the murder inquiry, added: "The thoughts of all of us are with the families and friends of those who have lost their lives."

The week-long search for the former dustman involved 300 officers from the North Yorkshire force, who were supported by a further eight other police forces.

About 60 worshippers gathered in Strensall on Sunday to remember Mr And Mrs Britton and the Sanderson sisters.

The Rev Martin Harrison said the village had been left shocked by recent events.

"Today we remember the past week. We pray for Mr and Mrs Britton, their family and friends, also remembering Claire and Diane Sanderson and their relatives as we ask for you to comfort them at this difficult time."

## APPENDIX K

### ECONOMIC NEWS

#### **Giving \$75 billion back, with plenty to spare**

*Microsoft is to return \$75 billion to its owners in the biggest-ever disbursement of its kind. The company had resisted making any payouts for years, but the maturing of its business and the ending of many of its legal battles have left it with no more excuses.*

CONVENTIONAL wisdom holds that companies ought to pay out their cash in the form of regular dividends in order to satisfy shareholders. This is partly because those shareholders need something to live on, and partly because such payouts prevent companies from squandering the money on stupid investments. For more than a decade and a half after its shares were publicly listed, in 1986, Microsoft flouted that wisdom. It refused to pay a dividend until last year, and then only started to pay a tiny one. It was able to get away with this miserliness because its heady rate of growth made its shares a must-hold for many investors. Microsoft's bosses also argued that they had to keep a huge cash pile on hand to cover possible settlements arising from the firm's antitrust battles. But now, finally, the company's bosses have capitulated. On Tuesday July 20th, Microsoft said it would return a whopping \$75 billion to shareholders over the next four years, in the biggest corporate cash disbursement in history.

Ostensibly, the main reason for the payout is that Microsoft has settled most of its legal battles. Just last month, the company's final appeal against a 2001 ruling by an American judge, which imposed "behavioural" remedies (and overturned an earlier ruling that Microsoft should be broken up) was thrown out. In March,

the European Commission fined Microsoft almost €500m (\$610m) and also imposed its own behavioural constraints, which should make it easier for rivals to compete with the company. Microsoft is appealing.

Regardless of the legal situation, Microsoft's bosses realised some time last year that they could no longer sit on their cash pile (valued at just over \$60 billion as of June 30th this year), and resolved to take steps to give it back to shareholders. The decision to return the money also reflects a recognition that, with its Windows operating system installed on 90% of the world's PCs, Microsoft's rate of growth will inevitably slow. Some critics said it showed Microsoft had realised that its shareholders could invest the money more profitably than the company could. Steve Ballmer, Microsoft's chief executive, was eager to dispel any impression that the company had lost sight of growth opportunities. He told analysts: "When we look out over the next several years, I'm confident we have some of the greatest dollar growth prospects... of any company in the world." However, lower-than-expected quarterly profits of \$2.7 billion, unveiled on Thursday, disappointed many of those analysts.

Quarterly disappointments aside, Microsoft has ended up with the enviable problem of having more cash than it knows what to do with, thanks to its Windows quasi-monopoly. Because the variable costs of each piece of software are very low (just a few compact discs and manuals), the firm makes a huge margin on each box of Windows software and its accompanying Office applications. Altogether, its operations spew no less than \$500m in cash every two weeks. As a result, the cash pile has just grown and grown.

Under the disbursement announced this week, Microsoft will pay out a special dividend worth \$32 billion in early December; buy back a further \$30 billion in stock over the next four years; and double its annual dividend to 32 cents per share. While all of these will together add up to \$75 billion, some reckon Microsoft is not being radical enough. After all, the cash continuing to gush in

over the next four years will be more than enough to fund the increased dividend and the share buybacks. Microsoft will still be left with some \$25 billion on hand.

This has fuelled speculation that Microsoft wants to retain the firepower to make a big acquisition: it emerged last month that it had held takeover talks with SAP, a German firm that is the leading provider of software to large companies. But a large acquisition would be fraught. For one thing, it would almost certainly attract the attentions of the antitrust authorities: in 1995, Microsoft abandoned its proposed acquisition of Intuit, a maker of personal-accounting software, after a lawsuit from the Justice Department. Moreover, Microsoft now has a vast range of partnerships with other software firms, hardware makers and telecoms and media companies. Making a large acquisition in any of these fields would alienate its other partners and might do more harm than good. This explains Microsoft's preference for doing small, sub-\$100m deals.

But even if Microsoft continues to sit on a large cash pile, the disbursement unveiled this week will ripple through the stockmarket and beyond. More than 1,350 mutual funds hold Microsoft shares. And Microsoft is also widely held by individuals: strip out Bill Gates and other large shareholders, and they hold 30% of its stock. The December special dividend will deliver \$9 billion to thousands of people just ahead of Christmas. As a comparison, President George Bush's expanded child credit amounted to a \$14 billion windfall to American families.

But the most interesting outcome will be the effect on Microsoft itself. There are already many signs that the company is seeking to change its image—from evil predator (Mr Gates was once dubbed "Darth Vader" by Scott McNealy of Sun Microsystems) to upstanding corporate citizen. Mr Gates's decision to establish a family foundation, to which he plans to donate his \$3 billion dividend, helps this image. The decision to give an enormous dollop of money back to its owners will probably help, too. Whether it will ensure that Microsoft does not become another

IBM—the technology industry’s previous colossus, now an also-ran in several areas it used to dominate—remains to be seen.

