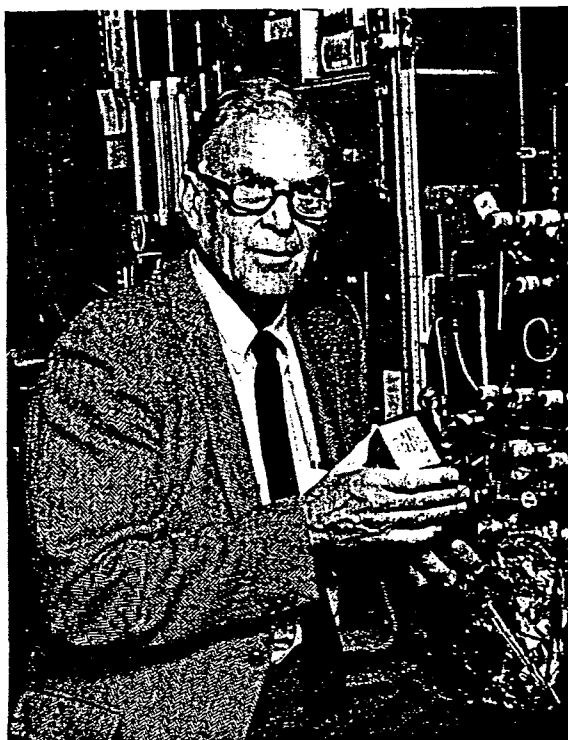




"My work is going fine. Unfortunately, it means the world is ending," said chemistry professor Sherwood Rowland. Fifteen years ago, he calculated that CFC molecules could wreak havoc on ozone.

Figure 5. 27 CCOT5 (Rowland) from *As the Ozone Thins, the Plot thickens*, The Amicus Journal, Summer 1991.

Figure 5.27 displays the image of a chemistry professor, Sherwood Rowland, in a laboratory. The fact that he does not wear a coat for working in the laboratory tells us that he is only posing for the photograph. Therefore, this photograph does not intend to provide the viewer with much experiential meaning, but rather interpersonal meaning. The writer strategically uses the photograph and the caption to create affectual meaning. The way Rowland looks directly at the viewer's eyes engages them personally, addressing them with a visual 'you' (Kress & Van Leeuwen 1996: 122). Armed with his scientific recognition, the man in the photograph exercises considerable influence over the readers/viewers by looking directly at the reader and saying "I, a chemistry professor, am telling you that the world is ending". In fact, there are some changes from the verbal text in the wording in the caption. The message in the caption taken from the written text partly recapitulates the wording. It reads:

Not surprisingly, pioneers like Sherwood Rowland get little satisfaction from being vindicated in sounding the alarm on the perils of CFCs. When asked by his wife how his work on CFCs was going, Rowland answered, "My research is going fine. Unfortunately, it means the world is ending!"

(As the ozone thins, the plot thickens, *The Amicus Journal*, Summer 1991)

The reader's emotional reaction is heightened by the message that in fact the professor talked to his wife, not the readers of the article. This is as personal and heartfelt as a message can be involving considerable interpersonal meaning, but at the same time Rowland's status delivers experiential meaning. When used in the caption, the quote omits Rowland's wife in order to create a simple caption which confirms the threats.

5.3.2.5 Quadrant B visuals : Population growth

Examples

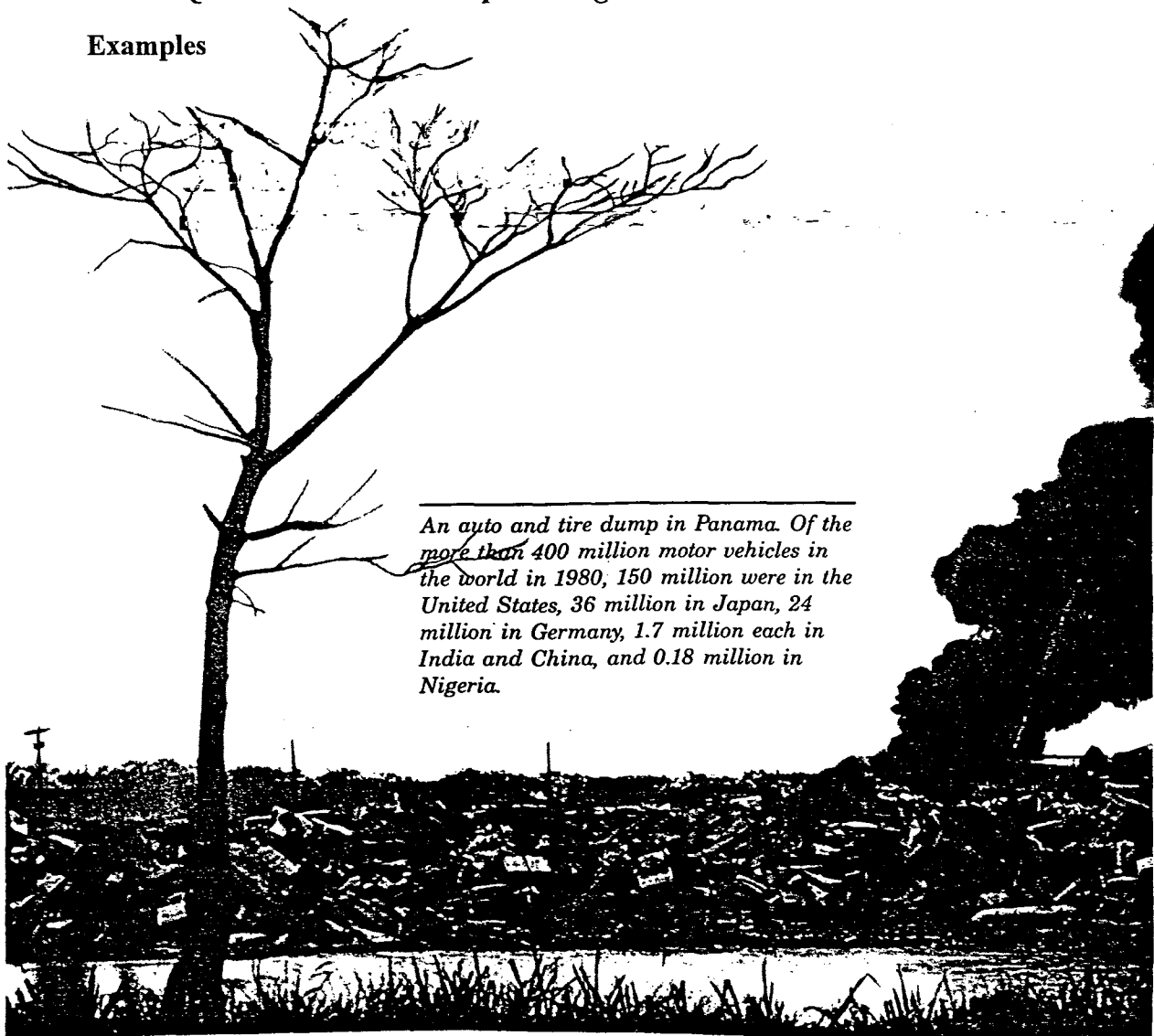


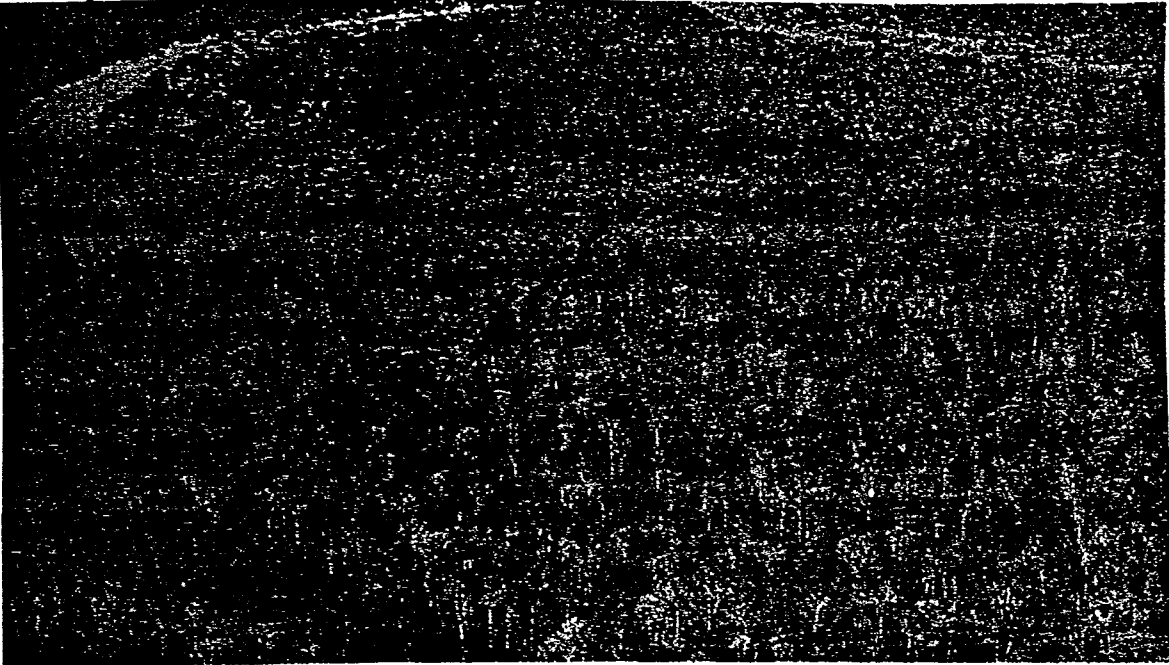
Figure 5. 28 PGRF1 (auto dump) from *Too Many Rich Folks, Populi*, Vol.16 (3), 1989.

Figure 5.28 is a photograph of an automobile and tyre dump which includes a dead tree, a river (by implication heavily polluted), and thick black smoke rising up into the air. Before reading the caption, readers/viewers can quickly grasp a sense of what the article will include because photographs such as these are widely used in media and have become icons of environmental issues, especially issues concerning pollution and overpopulation. In addition, these two issues are believed to reside particularly in countries labelled as 'Third World'.

The scenario in the photograph does not avoid the practice even though the main argument of the article concerns *population growth and overpopulation among the rich countries [which] are creating a lethal situation for the entire world*. Yet, the photograph, found on the front page of the article and taking up most of the page, does not correspond to the main argument. Instead of inserting a photograph depicting activities that reinforce polluting acts by the rich countries, the writer/editor uses a photograph of an automobile and tyre dump in Panama (which is noted in the first line of the caption). Ideationally, the photograph and the caption tell the readers that the rich use more vehicles than the poor, which can imply that the rich generate more waste, yet it implies at the same time that it is still the poorer nations which produce car dumps beside rivers. Textually, it restates a small part of the explanation. Although the restatement captures only a small part of the text, the fact that the information is presented twice can, to some degree, amplify the reader's emotional reaction. The more than half-page photograph, its caption, and GLIMPSE (containing half a page of enlarged bold text) together constitute strong cultural propaganda on environmental issues as well as a message on resource waste by the rich nations. Consequently, it has a high interpersonal orientation.

5.3.2.6 Quadrant B visuals : Deforestation

Examples



DISASTROUS DEVELOPMENT: Dams supply little electricity, flood huge areas and provide breeding grounds for mosquitoes
Figure 5.29 DTF8 (Brazil's forests) from *Playing with Fire, Time*, September 1989.

This is a photograph depicting a forest and dams. When viewing the photograph without reading the caption, the readers can immediately get the total gestalt of the photograph, that is, that it concerns forests. The caption reassures us that the message in the photograph is a critique of the type of development that has a negative impact on natural resources. Thus, the photograph and its caption have an ideational function. Textually, the caption marks off only a specific ideational point in the EVALUATION. The photograph itself does not convey interpersonal meaning, but when viewed with the caption, they both create some degree of interpersonal function. The fact that they are placed on the same page as the verbal information helps the readers to refer one to the other. Moreover, the messages in the EVALUATION and in the caption express negative affectual meaning, for example, *the results of the development have been chaotic and in some cases tragic, inescapable mosquito-borne disease, wretched disease, and disastrous development*. These negative meaning are expressed twice, and reinforce the reader's concern over the path of 'development' in Brazil.



Hatchling green turtles head toward the sea. U.S. environmentalists are working closely with the Nicaraguans to protect the endangered green and olive riddley sea turtles.

Figure 5. 30 DTP3 (turtles) from Make Parks, Not War. *The Amicus Journal*, Fall 1987.

DTP3 (turtles) is a photograph depicting green sea turtles heading towards the sea. It gives the readers some ideational information concerning the environment and reminds us of the sensitivity of some issues. The caption which is congruent with the visual makes it clear to the readers that a group of environmentalists are acting to help the endangered turtles. The caption performs the textual function by marking off the information expressed in the element SOLUTION.

5.3.2.7 Quadrant C visuals: Climate change

Examples



Figure 5.31 CCM1 (cows) from *Methane: the Hidden Greenhouse Gas*, *New Scientist*, May 6, 1989.



Figure 5. 32 CCM2 (cow dung) from *Methane: The Hidden Greenhouse Gas*, *New Scientist*, May 6, 1989.

These two photographs appear in the 'Methane' text which mainly deals with the sources, the significance, and the consequences of methane production. One source of methane mentioned in the article is from cows. It can be considered that the two photographs have a hypotactic relationship; CCM2 (cow dung) is dependent on CCM1 (cows). The readers learn about the relationship between cows and cow dung, and about methane from the information given in the first part of the GLIMPSE (*Methane from cows, rubbish tips and rice fields is warming the Earth.*) and in the first three paragraphs of the text which are placed next to the photographs. The photographs appear, without captions on the same page, which may not play an important part in the role of the visual in this case because the information is provided next to the photographs.

Even though the readers can see the obvious 'link' between the photographs and methane from cows, the information aspect is very low or nil in terms of the ideational perspective. The two photographs do contain some interpersonal involvement; they catch the reader's attention and raise curiosity about their not readily apparent relevance. This raises the issue of the purpose of visuals in the genre. As mentioned above, not all visuals add any meaning despite containing a vague visual link to the subject matter. Can we regard the photographs of cows and cow dung as merely 'filling space'? Or is there something more subtle, even deceitful, going on here? Could it be that these photographs warn us of danger all around, even in what we thought were accepted aspects of our daily lives? Is the message here one of a subtle raising of anxiety in the reader? Such speculation, while valid can also serve to remind us of the subjective aspect to 'meaning taking' from texts, especially from visual texts.

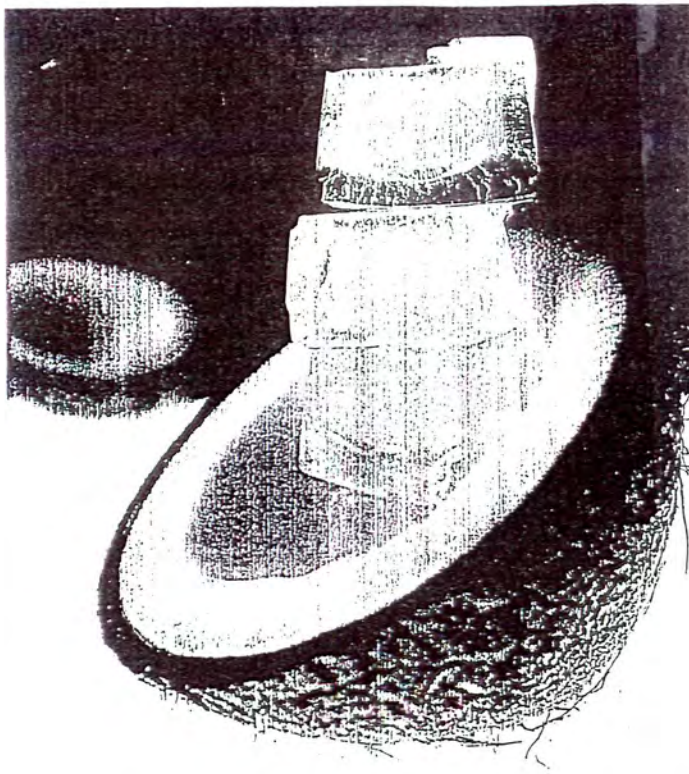


Figure 5. 33 CCD1 (coconut and ice) from *Drying out the Tropics*, *New Scientist*, May 6, 1995.



Figure 5. 34 CCD3 (starfruit) from *Drying out the Tropics*, *New Scientist*, May 6, 1995.

Figures 5.33 and 5.34 are from the same article and are neither totally realistic. They have been processed, that is, put in a new frame instead of maintaining their natural state. Both photographs are intended to be metaphorical. The absence of captions allows the readers to interpret the meaning of the photographs by referring to the title of the article, *Drying out the tropics*, and the subheading (*Ice in Hawaii*) which appear adjacent to the “starfruit” photograph. Coconut shell and starfruit are tropical fruits, which conjure up an image of the “tropics” whereas ice cubes in the coconut shell, the icy skin of starfruit, and an icy plate connote the idea of coldness—here the threats to the ice poles, and of sea levels are juxtaposed under the context of global warming. The photographs reflect the idea of an artistic work and emotional reaction rather than giving clear ideational and textual elaboration. The main point of the argument in the text is that the tropics may not be able to escape the dire consequences of global warming but the idea reflected in the photographs alone does not capture that meaning. Conversely, they convey a meaning contradictory to the information provided in the written text. What they do provide is for the readers to share in the interpersonal aspect of the photographs, that is, a desire for the conditions expressed in the photographs. Each photograph takes up more than one-fourth of the page and neither gives much more information than playing with the idea of coldness and hotness.

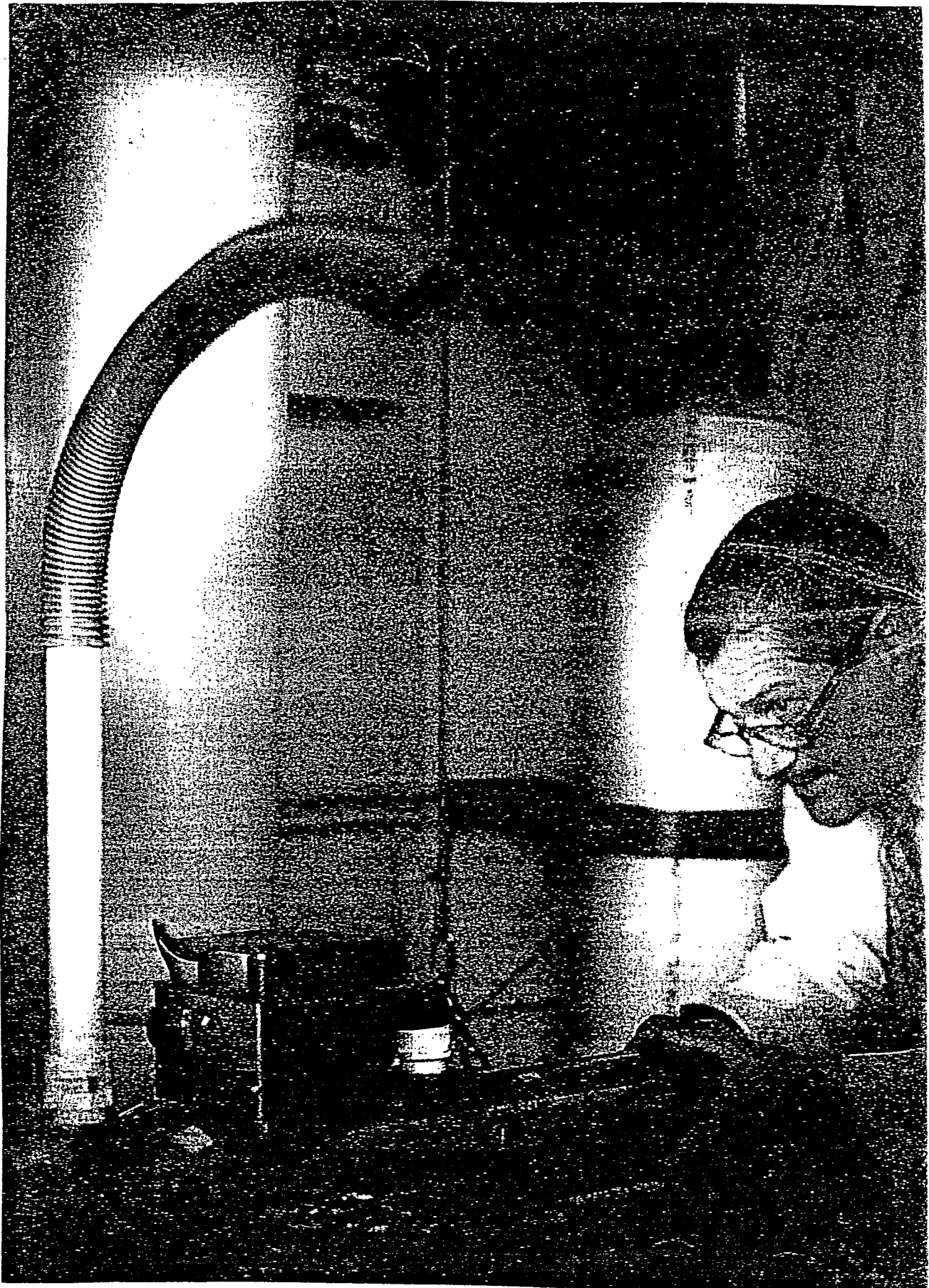


Figure 5. 35 CCP2 (Charlson 2) from The Parasol Effect, *Discover*, July 1993.

This whole-page photograph depicts a scientist (Robert Charlson) with a piece of scientific equipment. Compared with CCOT5 (Rowland) which is also an image of a scientist, there is not much ideational or textual value. It serves to remind the readers of the fact that the “parasol effect” is a proven fact because the readers are shown a naturalised image of the scientist through whom the anecdote is told, thus giving the article scientific credibility. This is the second two-page photograph of Charlson in the text. His credibility is strongly established in combination with his domination of the verbal text also (see chapter four). The use of one whole page appears wasteful and reduces the opportunity of the verbal text to present greater ideational meaning, but the high interpersonal value of the visual is a strategic compensatory mechanism for the inherent scientific uncertainty surrounding this climate change issue.

5.3.2.8 Quadrant C visuals : Population growth

Examples

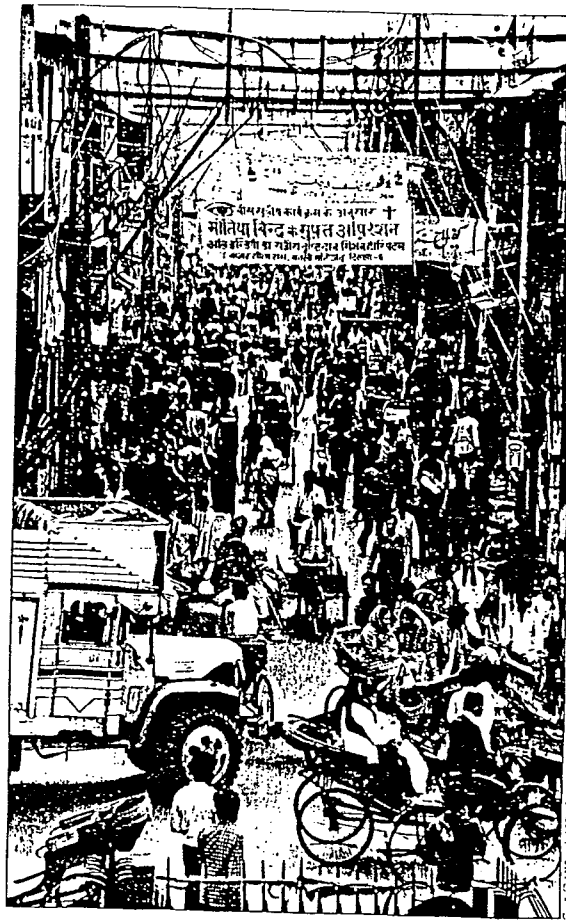


Figure 5. 36 PGH1 (starving boy) from *Hunger Versus the Environment: The Recipe for Global Suicide, Our Planet*, Vol.4 (6), 1992.

In Figure 5.36, there are two major images: a boy and a forest. The image of the boy can be decoded in several ways. This photograph is presented without linguistic signs,

that is, a caption. The title of the article may be intended to perform the function of the caption for this photograph because the photograph is positioned close to the title. The fact that he has black skin (and, by implication is a representative of the Third World and thus a victim of poverty, starvation, underdevelopment, and overpopulation) and that he is a boy (youth in distress heightens interpersonal meaning) can be construed as implying that the future of the planet is in danger. The forest which forms the background to the total image is a token of nature or environment. Together, the pitiful black boy and the forest can be decoded to tell us that the future of our environment is dangerous. According to conventional wisdom, hunger (as seen in the title) is caused by overpopulation. When viewed with the title (HUNGER VERSUS THE ENVIRONMENT: A RECIPE FOR GLOBAL SUICIDE) which acts as the caption, the meaning encapsulated in the visual calls for the creation of an overall impression, a total gestalt which would trigger the reader's personal engagement. That engagement involves social and cultural assumptions in its construction of the meaning by the verbal and visual texts. The photograph, as a representation of 'Western' social and cultural assumptions, is also, arguably, a further example of the iconography of Western media and its reductionist representations of population growth and deforestation issues¹. By comparison, the experiential and the textual meanings of this photograph are quite low.

¹ See chapter 1 in *Global Glasnost: Toward a New World Information and Communication Order?* by Galtung, J. and Vincent, C. (1992). Hampton Press. New Jersey, for a detailed discussion of the role of the Western media in constructing negative representations of non-industrialised societies and cultures.



A crowded world: but there's more to pollution than people

Figure 5. 37 PGTML1 (crowded city 1) from Too Much Life on Earth?, *New Scientist*, May 1990.

As with the last visual discussed, this photograph utilises a standardised and clichéd scene from a developing nation to suggest that overpopulation is the root of global environmental problems and is a Third World problem. PGTML1 (crowded city 1) depicts a crowded urban scene. The caption which reads “*A crowded world: but there’s more to pollution than people*” does not tell the readers where the photographed location is. This photograph presents a stereotypical view for the population issue. The photograph hardly performs ideational and textual functions; it merely provides an image of a crowded street. What dominates the photograph is its interpersonal orientation; it heightens the reader’s emotional involvement. Without being told where the scene is, most readers will know immediately from the characters written on a poster, the clothes people are wearing, or the vehicles they use that it is a city in India. A scene in India is selected to represent the concept of overpopulation

because most people are aware that India is one of the overpopulated countries. Furthermore, such a scene as this has been repeatedly and excessively used by mass media when they talk about overpopulation. The readers' perception of the photograph are reinforced by the title of the article (*Too much life on Earth?*). It can be seen that a quarter of a page is devoted to an illustration that does not assist the readers to learn more about the population issue and even though the caption implies that allocating blame for environmental problems is not just a population issue, the meaning in the TITLE and GLIMPSE reinforce the population-environment link.



Nearly 1 billion people today live in "absolute poverty" (on the very margin of life), according to author McNamara. Their number is likely to rise by some 100 million during the 1990s.

Figure 5. 38 PGP4 (mother and child) from *The Population Explosion*, *The Futurist*, November-December 1992.

PGP4 (mother and child) displays an image of an African mother who looks anxiously at her child. As with PGH1 (starving boy) and PGTML1 (crowded city1), this photograph is an index of overpopulation and poverty. Even though the readers learn some experiential meaning from the caption which states that the number of very poor people is likely to increase by some 100 million during the 1990s, the effect of the caption in terms of the interpersonal aspect tends to be foregrounded by the textual

function. That is, it appears that the caption *Nearly 1 billion today live in "absolute poverty" (on the very margin of life), according to author MacNamara. Their number is likely to rise by some 100 million during the 1990s.* only reiterates the information in BRIDGING and PREDICTION. The reiteration, however, utilises the quotation of an authority (Robert McNamara, a former president of the World Bank) to increase the credibility of the caption. The detail in the BRIDGING and the PREDICTION reports facts and figures from developing countries. It attempts to appear objective and there are no attitudinal lexis employed to heighten the reader's emotional reaction. When the same information is placed underneath the icon of overpopulation and poverty, it works to amplify the reader's interpersonal involvement.

Paul Ehrlich says that we have overloaded the planet's biological circuits and are breeding ourselves to oblivion.

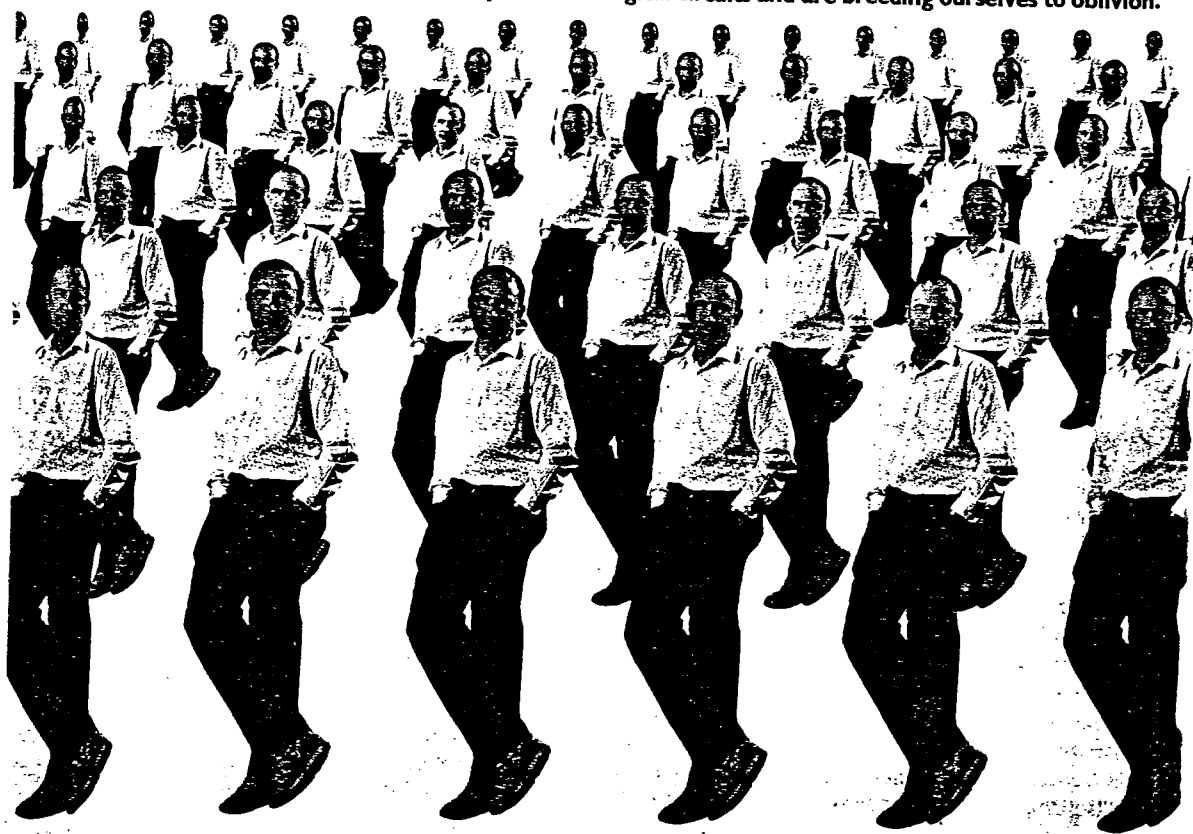


Figure 5. 39 PGN1(multiple man1) from The Numbers Game, *Discover*, April 1990.

Figure 5.39 is a processed photograph of a man duplicated many times. This appears as an attempt to move from the naturalistic mode towards the diagrammatic in order to present the idea or concept, which is quite difficult to present in a naturalistic form. The idea presented in the multiple man is a metaphor for overpopulation. Interestingly, this photograph is used twice, appearing on two consecutive pages. Each photograph takes up half a page. On the last page of the article, there is another half-page photograph of another man duplicated into many people (PGMP4: multiple man 2). In all, the photographs which do not have high ideational value, occupy one and a half pages. In addition, another half page is devoted to the TITLE and the information in GLIMPSE. Without the captions, the photographs would have had very low textual meaning. Multiple man 1 caption (*Paul Ehrlich says that we have overloaded the planet's biological circuits and are breeding ourselves to oblivion.*) sums up one side of the argument on overpopulation while that of the "multiple man 2" (*Julian Simon welcomes our increasing population because we are building up the ultimate resource: human.*) recapitulates the other side of the argument as presented in the article.

This second photograph builds an ideational and interpersonal meaning because rather than depicting a man in a relaxed pose (is the image here nonchalance, indifference?) as does the first photograph, it depicts a man in a suit. This is clearly meant to depict resourceful, industrious 'man'-- a way out of our problems of overpopulation. The use of differing images however has little overall informative benefit. I suggest that it could be argued, however, that depicting a besuited man implies that the solutions to environmental problems will come from the industrialised nations.



Figure 5. 40 PGMP2 (cartoon farmers 2) from *How Many People Can Earth Hold?*, *Discover*, November 1992.

Figure 5.40 uses a stylised image of men and a crop plant. It takes up a whole page and its strong ideological content enables it to dispense with a caption. The image depicts three men harvesting a plant, two of whom are balanced on the backs of others. The man at the top finds the plant provides insufficient for all of them. Various subtle inferences can be drawn: the burden of population, the balance of the environment, and (perhaps) the greed of those in advantaged positions. Most striking is the image of the Third World which is conveyed by the dark-skinned characters in the image. In all, the visual represents the iconography of “Western” representations of the Third World and reinforces my argument of cultural bias inherent in the popular science discourse. All of the experiential, interpersonal, and textual meanings contained in this visual are strongly conveyed. The use of iconography serves to strengthen the experiential and interpersonal meaning while textual meaning is high because it offers an overview of the issues presented in the verbal text.

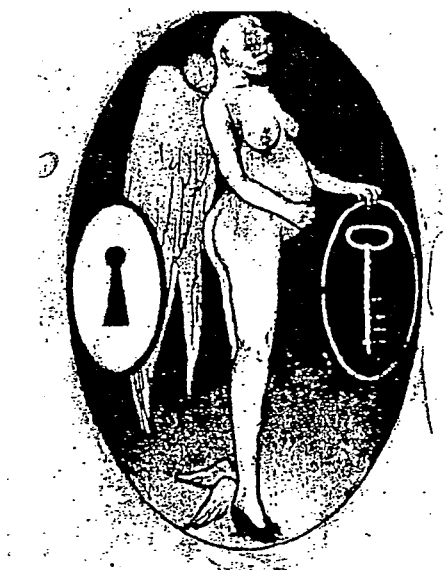


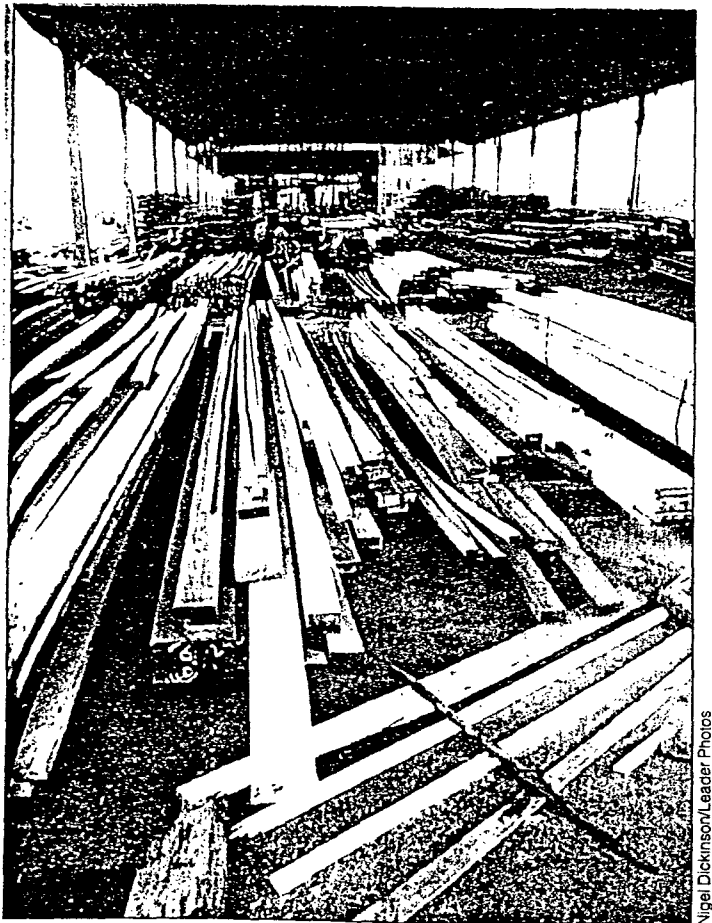
Figure 5. 41 PGTM4 (pregnant angel) from Ten Myths of Population, *Discover*, April 1996.

Figure 5.41, a stylised form of representation, depicts a pregnant woman with two wings, who is intended to represent an angel, who is holding a key in her hand. The

absence of a caption makes it quite difficult to understand the meaning the picture attempts to convey. Unlike other illustrations, it is also impossible to guess its meaning without reading the article. A verbal explanation is found (in BRIDGING), positioned under the picture, which discusses the key role women have in helping to solve the population problem. Metaphorically, the picture captures the meaning expressed in BRIDGING, which can be regarded as having an ideational meaning. This type of presentation can neither enhance the reader's knowledge of the issue nor take them beyond the information given. The textual meaning is to echo a small part of the information in the article. It may stimulate the reader's personal interest in that they wish to know the relationship between the picture and the issue being discussed.

5.3.2.9 Quadrant C visuals : Deforestation

Examples



Forest flooded: hardwood planks pile up in a timber yard in Sarawak

Figure 5. 42 DTC2 (timber yard) from The Tropical Chainsaw Massacre, *New Scientist*, September 1989.

DTC2 (timber yard) is a natural photograph that depicts piles of timber. The photograph itself provides ideational meaning which is easily accessible to viewers. The caption supplies the extra information that this timber is in Sarawak. It can be argued that the textual and interpersonal meaning of this photograph are comparatively low because it is not congruent to the verbal information and does not involve the readers emotionally. It rather acts as another piece of information that the writer wants to give to the reader and therefore has no 'double seeing' function. The pun in *forest flooded*, adds high interpersonal meaning in its combination with the use of the words *chainsaw massacre* in the TITLE.



DESPERATE HUMANS: The forests of Madagascar are being felled by people like this ax-wielding man and sold as charcoal at roadside stand

Figure 5. 43 DTEC3 (Madagascan villager) from *The Making of an Eco-Disaster*, *Time*, November 1994.

This photograph presents an image of a villager with an axe in his hand standing among sacks of charcoal. The axe symbolises a “wood cutting” activity. Ideologically, the wood cutting activities in the Third World countries are often referred to as deforestation. The meaning of this photograph is low in terms of the textual perspective because it is not congruent with the verbal information. On the contrary, its interpersonal meaning is quite high when viewed with the caption because the heading of the caption contains a negative affectual meaning (*desperate humans*). The positioning of the photograph also helps amplify the interpersonal force; the photograph is positioned below the TITLE and the GLIMPSE. Both elements express a negative affectual meaning, that is, *THE MAKING OF AN ECO-DISASTER* and *Despite heroic efforts, Madagascar’s splendid animals and wondrous forests may be doomed*. Interestingly, the GLIMPSE attempts to arouse emotion over the loss of forests and animals rather than the desperate plight of local populations. This appears to be a pitch to mainstream Western values on environmental as opposed to geo-political issues.



Figure 5. 44 DTEC1 (chameleon) from The Making of An Eco-Disaster, *Time*, November 1994.

DTEC1(chameleon) is a photograph accompanying the ‘Eco-Disaster’ text. The photograph enables viewers to relate it to the deforestation issue. Its textual function is not very high because it does not summarise the text; it merely holds a place in the

argument. Interpersonally, there is no emotional reaction contained in the photograph. However, the interpersonal force is expressed in the caption, namely, *threatened nature: unique chameleons, ... are among the irreplaceable treasures*. The wording in the caption is congruent with part of the wording in the element PROBLEM.



Camila Garrett-Jones/Oxfam

Chico Mendes: a catalyst for "extractive reserves"

Figure 5. 45 DTK6 (Mendes 1) from Kill or Cure? Remedies for the Forests, *New Scientist*, September 1989.

DTK6 (Mendes 1) is the last example of a common strategy in the articles' use of visuals. It is a photograph of an activist who opposed deforestation in Brazil. Ostensibly, it looks as if it is inserted merely to use space. In fact, it does more than that. The photograph itself has low ideational content but the caption provides additional information about Mendes, pointing out he is a "catalyst for extract reserves"—a term explained in the SOLUTION just below the photograph. Thus, the textual function that the photograph and the caption combine to perform is recapitulation of the text. This photograph is interesting in terms of the interpersonal motif. Chico Mendes, murdered due to his attempt to stop deforestation in Brazil, was

a hero among environmentalists trying to preserve the rainforests. He is an icon of the deforestation debate and this photograph of him is employed to create an emotional appeal. The manner in which he looks directly at the viewers' eyes explicitly demands something from the viewers (Kress and Van Leeuwen 1996: 122). His hand gestures suggest that he is pleading. The non-verbal communication of this photograph is congruent with the verbal information in the last portion of the text in RECOMMENDATION below the photograph which reads:

Kill or cure?

For that to happen, research is essential. In a lengthy interview just before his death, Mendes argued that: "There are an infinite number of natural resources in the forest ... We want the government to encourage the industrialisation and marketing of forest products that it has always ignored in the past. The universities should spend some time researching the Amazon region. If this happened, and if the government took it all seriously, then in 10 years the Amazon region would be very rich and have an important role in the international economy." It would also still have its trees.

The 'double seeing' effect of this photograph has an important role here; it helps to amplify the interpersonal force expressed verbally and non-verbally.

5.4 DISCUSSION

To summarise, what emerged from the analysis of the visuals is a systematic pattern of how visuals are employed in the three sets of texts. That is, a large number of the visuals are clustered around the 'naturalised' end of the Diagrammatic/Naturalised axis in Figures 5.5, and thus a very small proportion are located around the 'diagrammatic' end of the axis. A relatively low number of visuals have a high order of information and are therefore high in ideational and textual value. On the other hand, there is a high number of visuals whose information content lies at the bottom of the order of information axis. These visuals, then, have low ideational and textual meaning. Of these, many express a considerable degree of interpersonal orientation, particularly those that take a naturalised form.

While ‘naturalised’ visuals, or those tending towards naturalisation in the texts on climate change and deforestation tend to contain localised meaning, pointing to a specific part of the written text, those in the population growth texts appear to be iconic or indexical images in which the readers/viewers can relate more readily to the issue of population growth. The fact that population growth issues appear to lend themselves so readily to iconic representation supports my argument that the genre reflects and reinforces Western social and cultural assumptions about ‘Third World’ countries, references to which feature heavily in population growth articles. The intent behind ‘popularisation’, especially of science, is to disseminate scientific knowledge to the general public. It would appear that visuals used in the texts under study do not fulfil their role in this process of the dissemination of the knowledge. I suggest further that this is because the genre has been hijacked partly by a non-scientific discourse which reinforces cultural bias. More visuals ought to perform the function of an ‘abstract tool’ in order to assist popular readers to have a better understanding of the issues. It may be that the written texts themselves already perform the task of explaining science to the popular readers and therefore the visuals do not play a significant role in making the readers understand the issues.

What also emerged from the analysis is the degree of incongruence between the visuals and their captions. This was evident particularly when the visuals portrayed the ‘realis’ aspect of the images while the accompanying captions contain the ‘irrealis’ aspect of the images. This suggests that the ‘irrealis’ is also part of the message in the visuals. It is worth pursuing whether the ‘irrealis’ represented in non-verbal form is the same as that presented in verbal form.

5. 5 VISUALS AND THEIR NEGATIVE PORTRAYAL OF THE FUTURE

To arrive at what kind of future is expressed in visuals and captions, the method of analysis already used to analyse affectual meaning in the written texts is employed here. The analysis consists of two processes of analysis. The first process requires;

1. Analysis of all visuals to see if they contain positive, neutral or negative affectual meaning.
2. Analysis of all captions to see if they contain positive, neutral or negative affectual meaning.
3. Comparison of the results gained from 1 and 2.

The second process entails;

1. Analysis of all visuals to see if they present the 'realis' or 'irrealis' meaning.
2. Analysis of all captions to see they contain the 'realis' or 'irrealis' meaning.
3. Comparison of the results gained from 1 and 2.
4. Mapping the combined results of both processes to ascertain trends in the presentation of meaning in the visuals and captions.

The discussion in chapter four showed that the crucial meaning expressed in the three sets of written texts was the evaluation of 'probable' futures. The result of the analysis of the visuals (Figure 5.46) reveals an absence of positive affectual aspect from all visuals. A significant number of visuals contain neutral affectual orientation as against those that contain negative affectual orientation (the respective mean percentages across the three issues are 67% and 33%, respectively). While there is a great difference between the percentage of visuals containing neutral and negative affectual meaning in the climate change texts (85% as against 15% respectively), and a significant difference between the percentage of neutral and negative affectual meaning in the visuals from the deforestation texts (66% as against 34% respectively), there is almost no difference in the percentage of the visuals containing neutral and negative meaning in the population growth texts (52% as against 48% respectively).

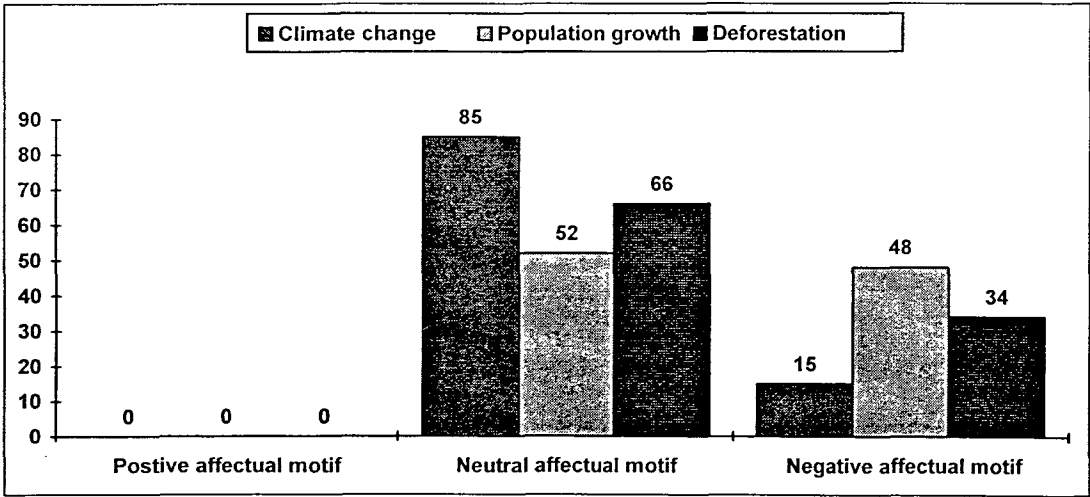


Figure 5. 46 Numbers and Types of Affectual Meaning in the Visuals of the Three Sets of Texts Expressed as a Percentage.

N.B. This graph is derived from Appendix 8.

The result of the analysis of the affectual meaning in the captions (Figure 5.47) reveals a pattern almost identical to that in the visuals. There are a much greater number of visuals with neutral affectual captions than negative affectual captions (the respective mean percentages across the three issues are 67% and 33%, respectively). Once again, the percentage of negative affectual meaning captured in the captions of the population growth texts is higher than that in the other two sets of the texts. Only three percent of the visuals in population growth texts contain positive affectual meaning. The other two sets of texts contain no positive affectual captions.

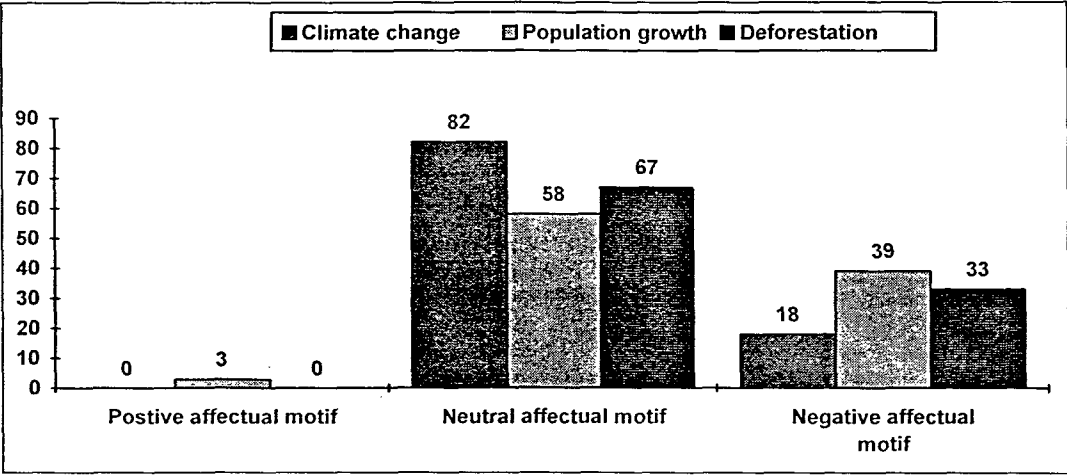


Figure 5. 47 Affectual Meaning in the Captions of the Three Sets of Texts Expressed as a Percentage.

N.B. This graph is derived from Appendix 8.

It can be seen that the pattern of affectual meaning expressed in the captions corresponds very closely with that expressed in the visuals. At this point, it can be inferred that the combined meaning of the visuals and captions accompanying the three sets of texts also conveys a certain degree of negativity in its affectual aspect. The explanation for the percentages of the negative affectual meaning not being high may be, firstly, because it is the verbal information which constantly conveys the negative meaning throughout the texts. Secondly, we must bear in mind the ‘double seeing’ function of visuals accompanying verbal texts which differs from the function and effect of visuals that are presented alone. Even though it was revealed by the analysis of visuals that the majority of the visuals accompanying the three sets of texts tended to have localised meaning, that is, visually representing only one sentence, or even one word in the verbal texts, the fact that the same negative information is presented twice can create a critical emotional impact on the reader’s perception of the issue.

Explanation must also be found for the higher percentages of negative affectual visuals and captions accompanying the population growth texts, particularly those images of people, or scenarios from the so called “Third World” countries. The common appearance of negative affect, most often contained in natural images, has been argued in this thesis as reflecting broader representations of “Third World” countries. Many authors have noted the negative representations of non-Western nations in environmental contexts. For example;

...with spreading deforestation and desertification all over the world, the poor were quickly identified as agents of destruction and became the targets of campaigns to promote ‘environmental consciousness’.

(Sachs 1992:29)

and because

In ordinary English the term ‘population’ evokes images of an explosion, mainly of uneducated Third World people, in countries that cannot repay their debts.

(Duden 1992: 146)

Now we can turn our attention to how futurism is expressed in the visuals. Figures 5.48 and 49 reveal that none of the three sets of texts have positive ‘realis’ and none positive ‘irrealis’ visuals. There are higher percentages of the neutral ‘realis’ visuals than the negative ‘realis’ visuals in each of the three environmental sub-issues. The percentages of both neutral and negative ‘realis’ visuals are significantly higher than those of the ‘irrealis’ visuals. The percentages of the negative ‘irrealis’ visuals in population growth texts are slightly higher than those of the neutral ‘irrealis’ visuals. There are no neutral ‘irrealis’ visuals in the deforestation texts and no negative ‘irrealis’ visuals in the climate change texts.

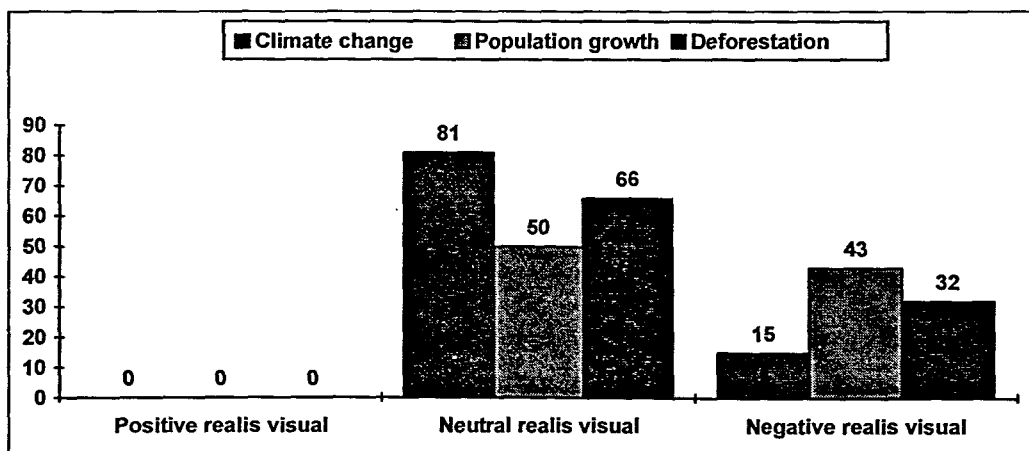


Figure 5. 48 ‘Realis’ Components of Visuals in the Three Sets of Texts by Percentage and Type.

N.B. This graph is derived Appendix 9.

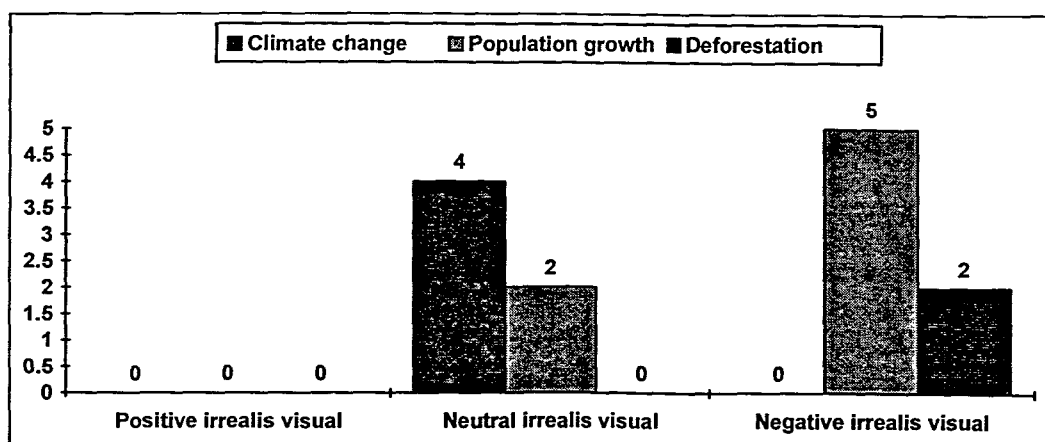


Figure 5. 49 ‘Irrealis’ Components of Visuals in the Three Sets of Texts by Percentage and Type.

N.B. This graph is derived Appendix 9

As for the captions, Figures 5.50 and 5.51 show that there are no positive ‘realis’ captions in all three sets of texts. The deforestation texts have the highest percentages of neutral ‘realis’ captions and this is also true for the negative ‘realis’ captions. The percentages of both neutral and negative ‘realis’ captions found in all texts are much higher than the ‘irrealis’ captions. Only a very low percentage of positive ‘irrealis’

captions are found in the population growth texts. There are no neutral ‘irrealis’ captions in the deforestation texts.

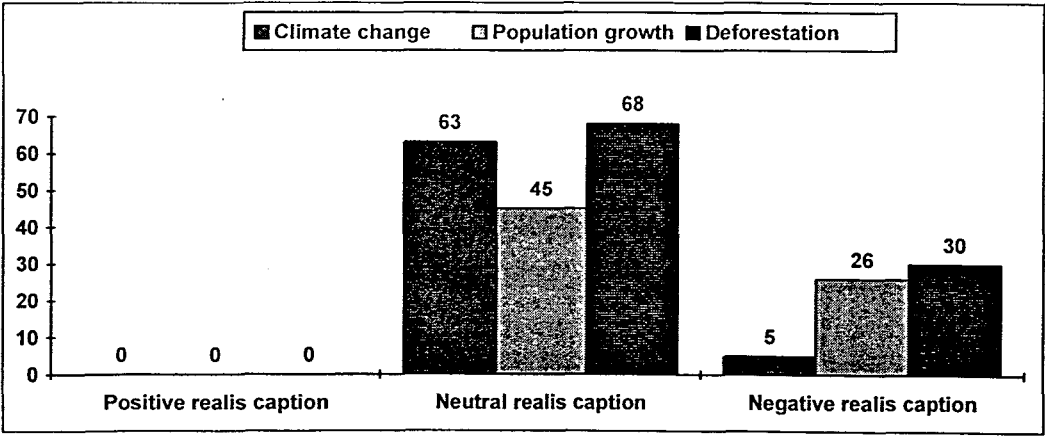


Figure 5. 50 ‘Realis’ Components of Captions in the Three Sets of Texts by Percentage and Type.

N.B. This graph is derived Appendix 9.

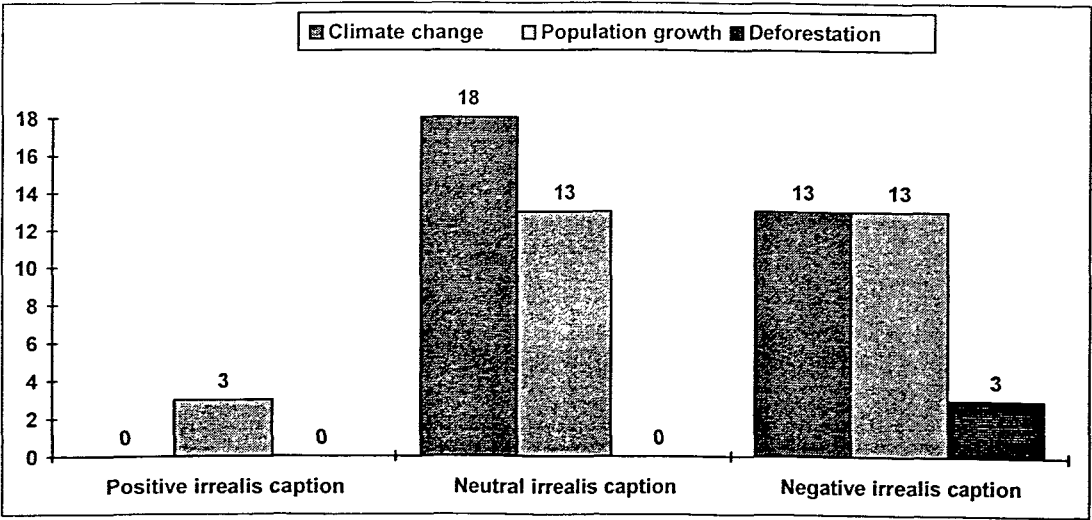


Figure 5. 51 ‘Irrealis’ Components of Captions in the Three Sets of Texts by Percentage and Type.

N.B. This graph is derived Appendix 9.

The above results are consistent with the findings of the analysis of the written texts discussed in chapter four. The two main findings are:

1. futurism is of crucial meaning in each of the three sets of texts,
2. the difference in the mode of expression concerning each of the three environmental sub-issues reflects their different statuses which range from being 'controversial' to 'established'.

Before discussing further, one caution ought to be offered concerning the complexity of the interaction between verbal and non-verbal forms of representation. The results of my analysis of visuals, which are shown in the Figures 5.48-5.51 were achieved through a straightforward analysis. Some visuals convey a sense of futurism explicitly, for example, a graph extrapolating future population numbers. In this case, the graph was categorised as being 'irrealis'. Some photographs which were categorised as 'realis' took on 'irrealis' qualities when considered with other components (captions, titles etc.), however, in such cases they remained categorised as 'realis' visuals, for example, (DTK6) as discussed on pages 277-278. It can be seen from Figures 5.48 and 5.49 that in all three sets of texts the percentages of the 'realis' visuals are higher than the 'irrealis' ones.

If visuals were not categorised according to the above criteria, the percentages of 'realis' visuals would have been reduced in favour of 'irrealis' visuals. Therefore, even though the 'realis' visuals are dominant numerically, it does not necessarily follow that the 'irrealis' aspect is low. It can also be seen from Figures 5.48-5.51 that the respective percentages of 'realis' and the 'irrealis' presence in captions are not congruent with those of the visuals. When considering the presence of 'realis' aspects in the visuals, we note relative congruence between visuals and captions for each of the three sets of text (see Figure 5.48 and 5.50). However, when we compare the presence of 'irrealis' aspects in visuals and captions (Figure 5.49 and 5.51), we note a far greater proportion of 'irrealis' aspects in the captions, compared to the visuals.

A reason for there being more 'realis' visuals in all three sets of texts, and this may be applicable to other environmental texts and to other genre, is that the essence of the

future cannot be photographed, that is, naturalised. There are two alternatives for representing the idea of future; firstly by presenting it in a caption, or secondly by employing other non-verbal modalities such as graphs or diagrams. It appears that the editors/writers of the texts in these present study preferred the first option, which was shown by the fact that 'naturalised' visuals outnumbered 'diagrammatic' ones. Second, it may be that popular articles deem it more interesting, or marketable, to insert 'naturalised' visuals than 'diagrammatic' ones, particularly concerning articles on climate change. The wide use of 'naturalised' visuals in reporting has been used considered specifically by a former environment correspondent for BBC News who notes that;

Above all, environment stories really need good pictures ... global warming is very difficult because you can't actually see global warming. You can see car exhausts and you can see smoking factory chimneys and you can hear people talking about it. But when you've done that you've more or less done the kind of story that I've done 20 times this year because the ingredients are almost always the same ... unless you're making a documentary with clever graphics then it's hard to ring the changes.

(An interview in 1990 cited in Anderson 1997: 121-122)

Further, the reason that 'realis' visuals are often utilised in the climate change texts even though the crucial semantic characteristic is one of the 'irrealis' may be that;

Pictorially it's a tricky one to show global warming because obviously they're showing something about the future. You cannot show what it is now apart from a few graphics. Once you've done those fancy graphics and a few bits of East Anglia battered by rising sea levels there's a sort of limit before you've sort of really got to use the same pictures again, but different script, different words.

(An interview with a former environment correspondent for ITN in 1993 cited in Anderson 1997: 122)

The second issue confirmed by the analysis of visuals and captions is that the differential mode of employment of visuals and captions by the three sets of the texts

reflects their different statuses. The fact that the deforestation texts have no neutral 'irrealis' visuals and captions and have quite high percentages of neutral and negative 'realis' visuals shows that the deforestation issue is regarded as one of relatively concrete issues, and as one whose core issues can be subjected to little further debate. The degraded condition of forests can be presented in visuals which proffer the proven facts. By considering the current states of forests as depicted in the visuals, readers are able to imagine what the future of the forests will be like. It is commonly known that it takes many years for forests to regenerate and this allows the writer/editor to insert negative 'realis' visuals and captions in presenting a moral judgment on the issue which is delivered with a threatening theme. This strategy is employed in the population growth texts in a similar manner. However, in these texts there is a slightly greater presence of 'irrealis' aspects contained in the visuals and captions and some degree of positive 'irrealis' captions. This means that the issue of population growth falls roughly midway between 'controversial' and 'established' on my scale. This reflects the debate surrounding whether having more people means having more of a good thing or means heightened pressure on natural resources. By comparison, the texts on the climate change issue, which is considered to be the most controversial, because of the uncertainty of future events, possess the highest percentage of 'irrealis' captions, and these convey messages shrouded in uncertainty.

A final issue confirmed by the analysis of visuals is that in many instances, they present images which carry negative stereotypical assumptions about non-Western populations. This also invites the suggestion that cultural assumptions distort the scientific content of the genre by reinforcing many negative aspects of "Western" representations of the "Third World".

Chapter Six

Conclusion

This research began with a culturally based concern about English language articles in popular science journals dealing with environmental issues. Although these issues are global in nature, Western popular science writings present only one cultural perspective on them. This singular perspective can be provocative to non-western cultures. My concerns about the linguistic construction of these perspective's stimulated my theoretical interest in the popular science genre. Working as an English instructor, I chose to do a linguistic investigation of this writing genre which involves the use of discourse analysis. A primary aim was to enable me to give my students a deeper understanding of scientific English. I chose to focus on environmental issues partly because of a personal interest, but also because the issues in the texts can be easily engaged with students from diverse disciplines. In addition, the overwhelming number of news items and articles in the media facilitates easy access to writing on environmental sciences. The more I read, the more provocative I found the language and content of the articles. I came to perceive that culture plays a dominant role in shaping the meaning of articles in the media and that this is reflected in the language.

In chapter one, I describe my own personal trajectory with respect to this topic. Chapter two comprises a theoretical discussion of the three-stratal relationship between context, semantics and lexicogrammar which is the conceptual framework of Hasan's GSP model and which is the main tool I have applied in this analysis. My discussion of register/genre includes a discussion of register variation. Chapter three details my analysis of the climate change texts, which identified the major components of the notion of GSP, and thereby revealed that the texts have a strong ideology of futurism. This was subsequently supported by the analyses of the population growth and deforestation texts, which are presented in chapter four. The

comparison of the three sets of texts also reveals that “futurism” is a key motivation of all the texts. Chapter five contains an analysis of the interaction between visual and verbal representation which helps characterise this genre. It shows that the discourse of the three environmental sub-issues constructs a negative view of the future. What emerges also is an image of inequality between the ‘developed’ and ‘developing’ world and despite some articles showing an appreciation of the wasteful resource consumption by industrialised nations, the mainstream ‘Western’ cultural perspective of popular science journals in environmental issues reflects the economic power relationship between industrialised and developing countries. The assumption that industrialised nations can speak for developing nations on environmental issues is assumed without question in the semantic construction of texts on environmental issues.

The articles in this study were selected because of their contribution to “popular understanding” about three central environmental issues. I have pursued a linguistic investigation of, and made a proposal for, the overall GSP structure of the texts as well as for the grammar that comprises the chief form of evidence for the meaning construction in these types of text. The three way perspectivism of the discourse structure, the semantics, and the lexicogrammar provide the optimum means for displaying the motivated choices that have been taken up by the writers. The thesis shows that by using the three strata as reference points for one another, one can clarify the consistencies of selection and the deeper sense of purpose in the text, including clearer ideas about what kind of ideological perspectives have been foregrounded and what have been backgrounded or even omitted.

As a starting point of the analysis, the texts were thought of as being information providers. However, as the analysis was extended, using the three perspectives provided by the three strata, it became more and more obvious that they were texts about activating the readers. It emerged that the semantics of the future had such a strong role to play that the idea of them being straightforward information texts is far

too simplistic and therefore misleading. The salient point here is that there is no doubt that these texts share a great deal of scientific explanation because the texts deal with different scientific aspects such as chemistry, biology, physics, and climatology. Certainly these aspects need to be presented to the readers. Without doubt their quantified relations need recognition and appreciation. However, the design of the thirty texts constitute a clear example of how the text intervenes in the social process, how the text is a form of action, and how the text is an instrument or event in the construction of socio-cultural meaning. The popular science writer as part of his magazine as a social institution is the designer in this kind of socio-cultural process.

The Hallidayan and Hasanian methods of using statements from three strata as a form of angular calculation of genre and purpose is an approach which relates context, semantics, and lexicogrammar to one another. By linking them to one another through their organisation, and patterns of consistent selection, we are able to comment on the purpose of the texts without imposing more strata on our linguistic model and more architecture on our linguistic theory. The core of such a commentary is semantic patterning--if patterns cannot be explained away as random or chance, then we must assume that they reflect motivated selections from the socio-cultural background--i.e. 'context of culture' (see chapter two).

Some aspects of this environmental science genre are shared with other popular sciences to varying degrees. The aspect of the text which acts as a catalyst for action to move the reader into more desirable modes of action and behaviour has been commented upon by Martin (1985). He categorises some texts as "hortatory". Note, however, that there are texts which are both factual and "hortatory". It is not necessary that texts be either factual or "hortatory".

To say that the texts here analysed are informative must be a provisional starting point only. Thereafter this provisionality becomes a tool to use when working through the actual selections of the texts for the analysis. The analysis reveals from the semantic

outline that the underlying purpose of, and the point of greatest consistency in, the meaning is that the texts are not merely informative, but display strong notions of exhortation and futurism. The texts highlight a special orientation, showing that all of the tenets about objectivity and information in science have to be seen against science as activism, science as change bringing, as information which both liberates and warns a community, and as a means of getting people to change the future in specific ways. All these may have long been part of science but if so, they are rarely emphasised. Scientists in general focus on objectivity and claim to follow a scientific method. (Even the debates over Popper's theories, for example, *Objective Knowledge*, 1972 still maintain the privileged neutrality of scientific theories). Perhaps this image of science in general is overstated, however what has been found in this study reflects a strong tendency towards 'science' telling us that "what we have to know now is what we must do now for the sake of the future". Perhaps one can find this emphasis on the future, including the need for a response, in other popular science writing such as in 'health science' warnings against cancer. The logic from the context is approximately equal. There may be a whole set of popular science texts which have an affinity with the texts on environmental sciences on the basis of this foregrounding of futurism. Upon reflection on my analysis, I consider the stress on the notion of future (what will happen, what should be done, what has been done) to be the most surprising aspect of the texts: it is not surprising in its presence, but in the way that it comes to be the 'dominant' of the textual organisation overall.

My study also demonstrates the way the 'cline of instantiation' works in Systemic Functional theory in bringing out a logic between the generic variations. The three sets of texts exhibit the preoccupation with the future. But this is not to say these concerns are exhibited in exactly the same way. They vary 'consistently', according to the topic being dealt with in a way which suggests that they must be characterised as part of one genre. The variation is not great but distinctive in the semantics and lexicogrammar. It follows the nature of the topic involved, whether climate change, population growth, or deforestation. In fact, the variation (between topics) facilitates

the topic-specific construction of the future. Therefore, as we noted in the deforestation texts, there was far less argument about the issue; the confusion or uncertainty on the issue is the least noticeable within this topic. Consequently, the process of the construction of an authoritative voice on the future is far less complex. The population growth texts reveal a certain degree of ambiguity in existing knowledge on the issue, but by and large the writers construe population growth as a negative event and know that the readers are similarly prepared. Thus, they do not devote time and space to the citing of authorities to establish the quality of the prediction of the future. In the texts on climate change, the writers employ the strategies of citing authorities almost exclusively in building up their argument about what will happen in the future. This uncertainty about what will happen affects different aspects of the discourse, such as how and how often the writers have to deal with predictions, introduce quotes, and make evaluative statements. As a result, these individual instances can be placed on a 'cline' from which we can see that the future is constructed systematically and logically¹. That is, we can identify the cause of variation and describe why it is that the writers on, for example, climate change put a great deal of emphasis on foregrounding authorities' voices while the writers on population growth and deforestation put less and least effort respectively in doing so.

The claims of the variations between individual instances are maintained at the same time that the systematic relationship between texts and the context is maintained. In addition, the utility of adhering to the notion of a genre within which texts share semantic and functional characteristics is demonstrated, thereby demonstrating that the three strata form the basis for seeing how Systemic theory can work out the characterisation of register. The text semantics is related systematically to the context because once you change the amount of confidence people have in the future, then, consequently relevant factors in the texts change. The generic analysis actually assists

¹ This system and logic nevertheless contains a 'Western' cultural linguistic and semantic bias which, arguably, has little cross-cultural application.

in the illumination of variation at the same time that it establishes the plausibility of the registral category.

By ascertaining what the texts contained, I could then also be clear about what had been omitted from the texts. The most critical omission is the notion of equality. The developed and the developing countries share the same world. But few texts discuss the inequality and none present any solutions as to how the two groups can become more equal. The genre presents itself as a voice of up to date knowledge from the developed countries. It tells the developed and developing countries what to do, or not to do in order to ensure better living conditions for all who share the planet. It is arguable, I suggest, that the genre reinforces a wider cultural bias in Western media. Notions of environmental irresponsibility in non-industrialised nations which are common in Western media reinforce the cultural bias in Western perspectives of political, cultural and economic systems in developing countries. This argument became particularly salient when I approached the question of congruence between the visuals and the verbals. In the visuals, the discourse of the future has even less to say about equality. When the differences between the developed and developing worlds are presented, they are presented as icons without any purpose related to how we can move towards equality. The result is that one of the implicit messages that readers would receive from such icons is that "Some places and peoples seem beyond change or even hopeless". These icons predominantly work to create and reinforce an underlying message of potentially wasted effort.

The analysis of the visuals reflects the analysis of text in that it reveals an absence of proposals about cross-cultural perspectives on the environment. This is one of the omissions that characterise this kind of text. Interest in predicting the future and what must be done about it is not equalled by interest in rectifying other geo-political mechanisms of global inequality and environmental degradation. For example, proposals to rectify the disproportionate per capita energy consumption between industrialised and developing countries is given scant attention in this kind of

scientific discourse. The same applies to proposals to rectify this situation. It is as if there is a commitment to be ecological and apolitical.

When it is difficult to know whether the genre is shaped by its pitch to a market or shaped by the limited scientific knowledge of the writer, then inferences about the readership are difficult to draw. It can be inferred from the scientific aspects of the journal articles analysed in this study that they do satisfy a demand for knowledge of contemporary environmental issues which increasingly touch the lives of most of us. The scientific aspect of the genre demands a substantial level of education and self-motivated interest from the reader. What emerges from the analysis of the verbal and visual text is that the readership of this genre most likely comprises well-educated and middle class people whose perspectives on the environment have already been shaped by wider social and cultural processes within their own Western society. It follows that we can infer strongly that the readership is an acritical readership and largely one that does not seek to have its stereotypical cultural assumptions challenged in any direct way. Despite this, one would also have to assume that a readership exists which can read the information in a critical way. This 'literacy' could come from deeper scientific training and/or familiarity with the genre and the plausibility of its range of claims.

A further distortion of the issues by the discourse is the concentration on 'Natural World entities' discussed in 3.6.3. Although it is evident that the physical processes involved in environmental degradation can be considered more pertinent to the issues than Natural World entities, writers, in order to satisfy a lay readership, move their focus from processes to tangible things. This is a critical and misleading aspect of the genre and has ramifications for its wider social impact.

The inequality issue is prominent in the current debate about reducing greenhouse gas emissions, as evidenced during the international conference in Kyoto, Japan in December 1997. Climate change texts tend to be sophisticated because the argument

revolves around the genuine scientific differences on the causes and effects of ozone depletion, 'greenhouse', or global warming, and the consequences of such phenomena occurring. The inequality issue is not as evident in the climate change texts as it is in the population and deforestation texts. However, the issue of inequality was central at the Kyoto convention in that only industrialised nations were required to give undertakings as to greenhouse emission reductions. Current debates dealing with the climate predictions (See Appendices 2.1 and 2.2) also show this inequality. When dealing with the more ideological issues of deforestation and population growth, the message is directed to the Third world countries and charges that it is their responsibility to take action. When the debate shifts to climate change, it is difficult to escape the concrete reality that the affluent countries consume vastly more fossil fuels per capita than the poorer countries. Still populations and leaders (Bill Clinton and John Howard) in the developed countries steadfastly refuse to compromise their living standards or jobs, and continue to divert the focus of debate from themselves to the uncertainties of forecast and fact (see Australia's recent claim concerning a "special allowance" for not having cleared land and hence deserving an 18% increase in emissions).

In summary, the analysis of the selected texts reveals that there is a great deal of information and debate about the changes that communities must undergo in order to create a better future. The scientific arguments are well-presented in terms of information (such as in BRIDGING); the 'irrealis' elements raise "problems" by the extension of present known facts to the future, but the real underlying causes and the geo-political aspects are never broadly confronted. This leads people in various continents, in such countries as Thailand, Indonesia, India, Kenya or Brazil to call for the non-partisan representation of these issues in various branches of the media.

In order to deal with sociological semantics in the Hallidayan sense, one needs to be able to move between strata while remaining within the proposals on context, semantics, and lexicogrammar. At each one of the strata, it is possible and important

to conceptualise the notion of a paradigm of options/choices. Also central to the current work is the concentration on clarifying the shape of the discourse as structure, context, discourse, semantics and lexicogrammar.

The central linguistic aspect of this study is the concept of the usefulness of three strata and I suggest that this study has demonstrated that one needs to be able to move up and down between them. One characteristic of the texts under study is that the semantics of popular science moves towards the semantics of *x is like y* (Attributes) rather than *x is y* (Identifying) which is a characteristic of specialist discourse. In addition, the lack of predictability between context (specialist) and context (popular), and the semantics and lexicogrammar suggests that it is difficult for foreign language learners or their teachers to prepare students for the wide range of meanings.

The implication of the use of GSP is that we can get a strong sense of the generic outline based on the meaning. However, due to the complexity of the articles and their differences with respect to 'service encounter' or the nursery tale, we had to deal with the syntagmatic unfolding in two levels. First of all, using a broad division into TUNING, FOCUSSING, and CLOSING and then unpacking these as an array of separate tasks which were set out in chapter three and four. The crucial point here is that the fixed ordering was not an issue that could be settled at the degree of delicacy of terms such as PREDICTION and CONCERNS. But nevertheless, expectations of the unfolding were made as well as proposals on the way in which the meanings change value depending on the place they hold in that unfolding. Some crucial meanings went through recursive cycles (in particular BRIDGING and EVALUATION pairs).

In considering whether we need a separate stratum of ideology, we need to bear in mind how ideology can be isolated and identified by consistency in meaning choices. The meaning choices isolated consistently in the text have tended to show cultural bias in the representation of Third World countries. These choices have been found to

be evident in both verbal texts and in visual texts although ideological meaning is more predominant in the choice of visual text. The congruence between the verbal and non-verbal texts is characterised by their construction of a sense of anxiety about the future and an underlying sense of the overwhelming nature of Third World conditions and policies. The incongruence between these two forms of text is characterised by the inability of the visuals to reflect a sense of future in the same way that the verbal text does. To compensate for this visual texts appear to rely highly on interpersonal meaning, or alternatively, use images which are devoid of scientific meaning. My study demonstrates that the three stratal approach successfully brought out these ideologically motivated choices without the need to add further strata to the functional model.

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