

Chapter Four

Findings of the Analysis of Texts on Population Growth and Deforestation

4.1 INTRODUCTION

In chapter three, the semantic elements of texts on climate change were proposed and discussed in terms of their semantic characteristics and realisation. This chapter reports on the analysis of texts on population growth and deforestation in order to gain further insight into the generic structure and the characteristics of texts in environmental sciences. The results of the analysis of texts on population growth and deforestation are compared with those on climate change. A cross-issue comparison can illuminate how environmental meanings are constructed and how the three issues motivate semantic variations among the three sets of texts.

It was stated in chapter one that environmental science is an interdisciplinary subject, thus a text in this discipline might exhibit certain characteristics from related disciplines. For example, a text in environmental sciences which discusses various aspects of the greenhouse effect may exhibit certain characteristics of texts in chemistry, climatology, and economics. A text on population growth may exhibit characteristics of texts in biology, economics, statistics, and politics. Alternatively a text on deforestation may display characteristics of texts in biology, agriculture, economics, and politics. It is, therefore, of interest to examine whether texts incorporating various disciplines would share some common characteristics. If they do, what are the characteristics they share, to what extent do the texts vary, and what motivates such variations? If not, what are the differences? Why do they differ? To answer these questions, the following sub-questions are posed:

1. Do the generic structures of the three domains appear sufficiently similar to count as one genre?
2. If they differ, does the difference lie in structure, sequencing, or semantic characterisation?

The steps of the analysis are presented in Figure 4.1.

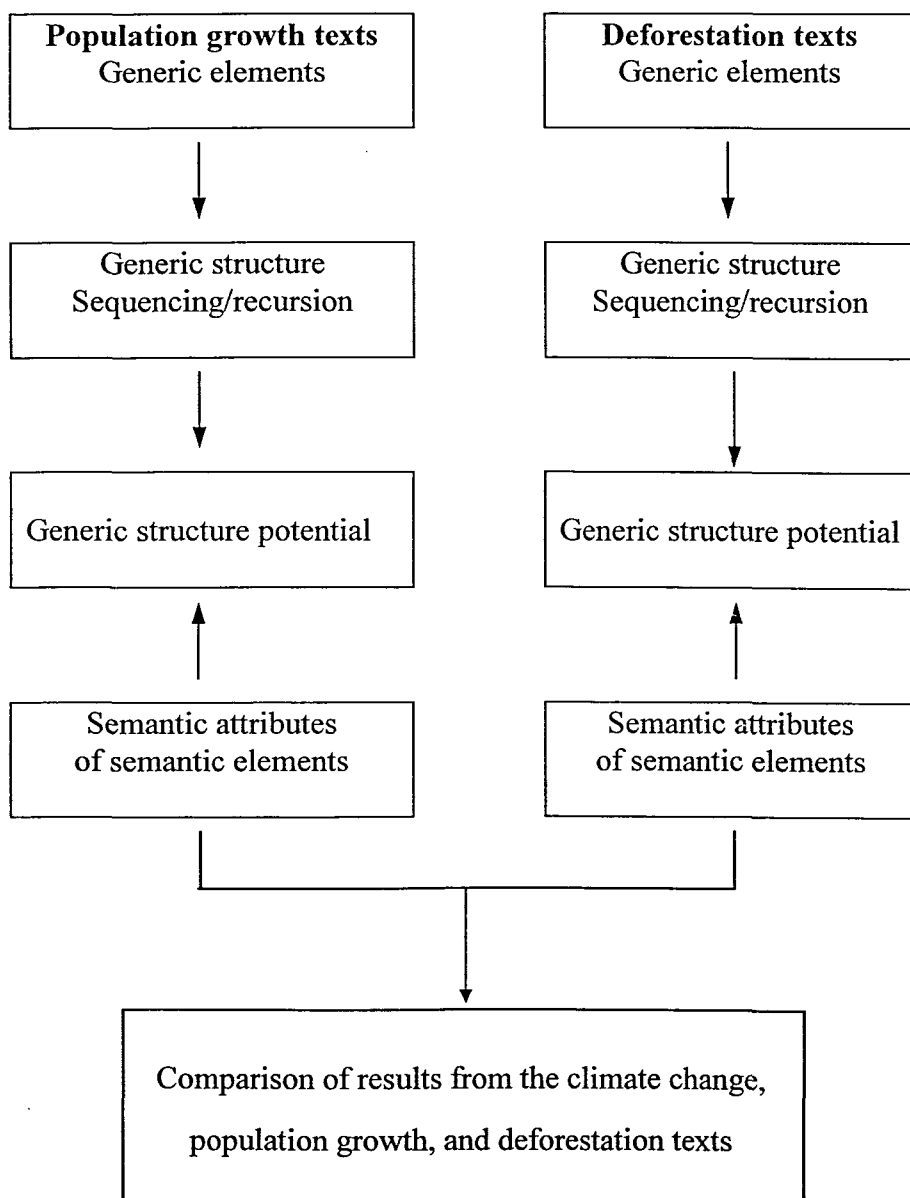


Figure 4.1 Steps of Analysis

4.2 POPULATION GROWTH

4.2.1 Texts on population growth and their source

TEXT	SOURCE	CODE
The numbers game	Discover, Vol.11, No.4, April 1990	Numbers
How many people can earth hold?	Discover, November 1992	Many people
Ten myths of population	Discover, April 1996	Ten myths
Of all things people are the most precious	New Scientist, January 1975	China's people
Population patterns in the mid 1970s	New Scientist, January 1976	Pop.patterns
Too much life on earth	New Scientist, May 1990	Too much life
Too many rich folks	Populi, Vol. 16, No. 3, 1989	Rich folks
Hunger versus the environment: a recipe for global suicide	Our Planet, Vol.4, No., 6 1992	Hunger
The population explosion	Futurist, November-December 1992	Population
Must the poor starve?	People & the planet, Vol. 4, No. 4, 1995	The poor

4.2.2 Synopsis of the Sample Texts

The Numbers Game (Numbers)

“Exploding populations” in parts of Africa, Asia and Latin America, are often blamed for much environmental degradation, however it is not over-population, but resource waste which creates problems. This may be caused by irresponsible government, wars, and other political failures. Some scientists are now concluding that population pressures have been exaggerated as many developing nations are achieving dramatic increases in income per capita and literacy. Opponents of Ehrlich’s warnings on population argue that notions of carrying capacity for the earth are inappropriate and argue that there is no physical limit to population as humans always produce as well as consume. Because there are no precise data on many global trends these types of assaults on alarmist reports continue to appear, however no scientist does not believe that the world is facing real problems.

How Many People Can Earth Hold (Many people)

UN estimates on population calculate that at the present rate of growth the world's population would increase 125 times by the year 2150. It is argued that the world cannot continue with a positive rate of population growth; eventually we must achieve a zero growth rate. Some scientific support for Malthusian approaches to population has come from agricultural experiments which suggest that land or water shortages, and fertiliser run-off, can interact to limit food production. The population sustainable for 50 or 100 years may not be sustainable indefinitely. Estimates for the earth's 'carrying capacity' differ markedly so to make credible estimates of the world's carrying capacity scientists must learn more of the interactions of population, environment, economy and culture.

Ten Myths of Population (Ten myths)

Population problems are entangled with economics, the environment and culture in such complex ways that few can resist unwarranted simplifications. Misconceptions such as 'human populations grow exponentially', 'there is a single factor which limits how many people earth can support', 'technology can solve any population problem', or 'population problems for developing countries are not problems for the United States', are discussed and argued against in this article. Issues of poverty, fertility, limits to technology, and the high resource consumption of developed countries are discussed.

Of All Things People are the Most Precious (China's people)

While many Third World countries are experiencing population growth rates of over 3% per annum, China's population of over 800 million is growing at only 1.7% per year. China has been especially successful in the important development aspects of economic advancement, health, women's status, education and others since 1949 which explains why China has achieved so much in family planning. Local advantages are that medical practitioners share the cultural and social milieu of their patients, birth control services are virtually free and such as that 90% of women are educated and employed. The land available for China to increase food production indicates that China has good prospects for further socio-economic advancement.

Population Patterns in the Mid 1970s (Pop. pattern)

In developed nations population levels are close to replacement levels and material abundance provides high standards of living. In Third World countries in Africa, Asia and South America, population rates remain high and living conditions are poor for great numbers of people. Population and development are inextricably interwoven. China, where birth rates are much lower than in other developing countries, demonstrates the positive result which government policy on population can achieve. Overpopulation is a dominant problem of the last quarter of this century and has significant ramifications for the environment, and quality of life in the Third World. Tackling the population problem will improve the prognosis for the human race.

Too Much Life on Earth (Too much life)

While neo-Malthusians blame most of the developing world's ills on population growth, arguing that high populations consume more of every kind of resource, anti-Malthusians argue that inappropriate technologies, over-consumption by the affluent, and inequality and exploitation, force poor farmers onto marginal land and force them to over-exploit it. This highly polarised debate is not scientific, but ideological. It should be recognised that consumption and associated technology determine the environmental damage caused per capita - multiplying this by the population arrives at the level of environmental damage. Reducing population can have a significant impact on the environment however other short term measures are vital also such as reducing consumption, using sustainable technologies and attacking inequality.

Too Many Rich Folks (Rich folks)

There is a widespread belief that population problems are centred in poor countries. It is in fact 'the rich' who dump most carbon dioxide and chlorofluorocarbons into the atmosphere and who are 'strip-mining' the seas. It is not population density per se, but the *impact* of people on the resources of the planet which create a lethal situation for the entire world. This impact can be conceived as some measure of affluence or consumption per capita, and as an index of the environmental damage done by the technologies used to

supply those units of affluence. In this way industrialised countries have a much more severe population problem than poorer nations. To solve the human predicament the developed countries must scale back on their resource use.

Hunger Versus the Environment: A Recipe for Global Suicide (Hunger)

“The picture of hunger in the last decade of this century is frightening”. The earth is “galloping” towards a situation where it will not be able to feed itself. There is evidence that area cultivated and yields can no longer be increased while this pressure on land is accelerating environmental degradation. Overfishing and pollution also reflect the pressure of population on resources. The costs of combating desertification globally are massive and its implications made worse by the huge amounts of agrochemicals used by developed countries to sustain production. Meanwhile developing countries sacrifice their natural resources in the battle against enormous foreign debt. Environmental degradation must cease if the world is to continue to be able to feed itself.

The Population Explosion (Population)

High population growth is worsening poverty and weakening an environment already fragile because of the burden of its population. Over 90% of population growth is occurring in the developing world, but what do these statistics mean in terms of alleviating poverty and achieving sustainable development. Environmental stress is a function of three factors; increases in population, increases in consumption per capita, and changes in technology which may reduce environmental stress per capita. Environmental damage per unit of production can be cut drastically. The remedies are costly, politically difficult, and require years to become effective, but are achievable. Developed and developing nations must adjust their consumption patterns to reduce environmental impacts of consumption.

Must the Poor Starve? (The poor)

Some scientists fear a growing imbalance between human numbers and the resources that support them. Per capita availability of world grains, which provide 80% of the world's

food, has been declining for 14 years while 1/3 of the world's cropland has been abandoned over the last 50 years because of erosion. Political unrest and unequal food distribution are factors which are also working to decrease food productivity and cause food shortages. The high use of fossil energy by 'developed' countries to maintain their standard of living is a huge drain on energy reserves. While technology can help improve management and use of various resources it cannot produce unlimited flows of natural resources needed for sustained agricultural production. Future strategies for global food production must include the curtailing of the growth of human population.

4.3 GENERIC STRUCTURE

I have provisionally adopted the elements worked out in the proposal concerning climate change issues and tested them against the semantics of population growth and deforestation issues. Part of the purpose of this chapter is to assess the degree of fit between those proposals and changes in the two new sub-issues. For discussion purposes, it is necessary to present the actual generic structure of the sample texts since it provides a general idea of the GSP of the texts and their semantic elements. Table 4.1 sets out the actual generic structure of the ten sample texts on population growth.

TEXT	TUNING			FOCUSSING					CLOSING														
NUMBERS	TTL	GLM	THR [PRB]	BRG	SPC [EVN]	BRG	PRE	CNS	SPC2 [EVN]	EVN	BRG [PRE]	SPC3	BRG [EVN] [EVN]	SPC4 [EVN]	BRG	EVN	CON [ANX]						
MANY PEOPLE	TTL	PRO	GLM	PRO	PRB	SPC 1	EVN	BRG [GCL] [SPC 2] [SPC3]	BRG	SPC4	PRE	EVN	BRG	CNS	BRG	EVN	BRG [EVN] [SGN]	CON					
TEN MYTHS	TTL	THR	[PRB]	BRG [SPC1] [EVN]	EVN	SPC 2 [BRG] [GCL]	EVN	BRG [EVN] [EVN]	PRE	BRG	COL												
CHINA'S PEOPLE	TTL	GLM	PRB	BRG [EVN] [EVN]	SGN	BRG	EVN	BRG	EVN	BRG	PRE	SGN	BRG	PRE	BRG	EVN	SGN	CON					
POP. PATTERNS	TTL	GLM	PRB	BRG [PRE] [PRE] [PRE]	PRE	BRG	EVN	SLN	EVN	CON	COL												
TOO MUCH LIFE	TTL	GLM	PRB	TLI	EVN	BRG	EVN	BRG	PRE	BRG	PRE	CON	REC										
RICH FOLKS	TTL	GLM	PRB	BRG [EVN]	EVN	BRG	SGN [EVN] [EVN]	PRE	REC														
HUNGER	TTL	GLM	THR	PRB	BRG [SPC1-4] [GCL] [PRE] [EVN]	GCL [EVN]	BRG	PRE	BRG	PRE	BRG [SPC5]	PRE	REC										
POPULA TION	TTL	GLM	SET	PRB	BRG	EVN	BRG	EVN	BRG	CNS	PRE	ONP	SGN	BRG [PRE] [GCL]	SGN	PRE	SGN	BRG	PRE	EVN	PRE	EVN	REC
THE POOR	TTL	GLM	PRB	SPC 1	EVN	PRE	SPC2 [BRG]	SPC3 [BRG]	PRE	BRG [PRE]	REC	COL											

Table 4.1 The Actual Generic Structure of the Ten Population Growth Texts. N.B. [.....] denotes embedded elements.

The table suggests that, at a high level of abstraction, texts on population growth and climate change share the same global GSP elements, namely, TUNING, FOCUSING, and CLOSING. The climate change elements appear to work at this stage of the investigation. Only one ‘new’ generic element was found in the population growth texts--SUGGESTION--which had not been found in earlier analysis. Its definition, function, semantic and lexicogrammatical features are examined in 4.5.1).

Despite such similarities, texts on population growth and climate change vary to a certain degree. To account for variation across the topics, an examination of the semantic elements is imperative because they are the strategies employed to achieve the function of the three global stages. The first point of comparison is that of variation within TUNING in climate change and population growth texts.

4.4 SEMANTIC ELEMENTS WITHIN TUNING

A comparison of the semantic elements within TUNING across climate change and population growth texts is provided in Tables 4.2 and 4.3. The tables reveal that within both sets of texts TUNING contains at least three semantic elements: TITLE, GLIMPSE, and PROBLEM. Five climate change texts provide readers with SETTING; two out of the five has PROBLEM embedded in SETTING. As an alternative to providing SETTING, one text chooses to provide the readers with PROPHECY, one with THREAT, and two with TECHNICAL LEAD-IN.

By comparison, three texts on population growth have THREAT, one THREAT being embedded in PROBLEM. One of the population growth text uses SETTING to assist readers in understanding subsequent parts of the article. One text has PROPHECY and one contains TECHNICAL LEAD-IN.

ELEMENT TEXT	TTL	GLM	SET	PRO	THR	PRB	TLI
COLD	+	+	--	--	--	+	--
PARASOL	+	+	[PRB]	--	--	+	--
OZONE HOLE	+	+	--	+	--	+	--
METHANE	+	+	+	--	--	[TLI]	+
ICY	+	+	--	--	--	+	+
ALGAE	+	+	+	--	--	+	--
DRYING	+	+	--	--	--	+	--
HEAT	+	+	+	--	--	+	--
OZONE VANISHES	+	+	--	--	+	+	--
OZONE THINS	+	--	[PRB]	--	--	+	--
TOTAL	10/10	9/10	5/10	1/10	1/10	10/10	2/10

Table 4.2 Generic Structure Within TUNING in the Climate Change Texts.

ELEMENT TEXT	TTL	GLM	SET	PRO	THR	PRB	TLI
NUMBERS	+	+	--	--	+	[THR]	--
MANY PEOPLE	+	+	--	+	--	+	--
TEN MYTHS	+	--	--	--	+	+	--
CHINA'S PEOPLE	+	+	--	--	--	+	--
POP. PATTERNS	+	+	--	--	--	+	--
TOO MUCH LIFE	+	+	--	--	--	+	+
RICH FOLKS	+	+	--	--	--	+	--
HUNGER	+	+	--	--	+	+	--
POPULATION	+	+	+	--	--	+	--
THE POOR	+	+	--	--	--	+	--
TOTAL	10/10	9/10	1/10	1/10	3/10	10/10	1/10

Table 4.3 Generic Structure Within TUNING in the Population Growth Texts

4.5 SEMANTIC ELEMENTS WITHIN FOCUSING

A comparison of generic elements within FOCUSING in the climate change texts and the population growth texts (Tables 4.4 and 4.5) reveals a high degree of similarity between them. The similarity lies in the fact that the semantic elements found in the climate change texts are also found in the population growth texts, except that SUGGESTION is found only in the population growth texts. The fact that both sets of texts all have SPECIFIC CLAIM, BRIDGING, and EVALUATION is not surprising. SPECIFIC CLAIM is the element which contains reference to the work of

specialists or experts. It is important in popular science texts because “science is one form of authority that we are taught to respect” (Corner and Richardson 1993: 223) and because expert testimony is required to increase the credibility of an article, the readers accepting that the (usually) non-scientist writer cannot know everything on a subject (Waugh 1995:132). BRIDGING is necessary since it provides popular readers with technical knowledge and also updates them on the latest issues in the field. In a similar vein, in EVALUATION, the writer offers some kind of judgment or comments because the popular readers do not have sufficient knowledge to do so.

PREDICTION stands out among all other elements, not only because it appears in most of the texts (on eight and ten occasions out of the ten in the texts on each of climate change and the population growth respectively), but also because the element renders a special characteristic of the texts, that is, a focus on the future. This characteristic becomes even more outstanding when we look at other elements within all of the three global stages (This aspect of the analysis will be expanded on in Table 4. 11).

ELEMENT	SPC	GCL	BRG	EVN	ONP	SLN	PRE	CNS	SGN
TEXT									
COLD	+	+	+	+	--	--	+	--	--
PARASOL	+	--	+	+	--	--	+	--	--
OZONE HOLE	+	--	+	--	--	--	+	--	--
METHANE	+	+	+	+	--	--	+	+	--
ICY	+	--	+	+	--	--	--	--	---
ALGAE	+	--	+	+	+	--	--	--	--
HEAT	+	+	+	+	--	+	+	+	--
DRYING	+	+	+	+	--	--	+	+	--
OZONE VANISHES	+	--	+	+	--	+	+	--	--
OZONE THINS	+	+	+	+	+	+	+	--	--
TOTAL	10/10	5/10	10/10	9/10	2/10	3/10	8/10	3/10	0/10

Table 4.4 Generic Elements Within FOCUSsing in the Climate Change Texts.

ELEMENT	SPC	GCL	BRG	EVN	ONP	SLN	PRE	CNS	SGN
TEXT									
NUMBERS	+	--	+	+	--	+	+	+	--
MANY PEOPLE	+	+	+	+	--	--	+	+	+
TEN MYTHS	+	--	+	+	--	--	+	--	--
CHINA'S PEOPLE	--	+	+	+	--	--	+	--	+
POP. PATTERNS	--	--	+	+	--	--	+	--	--
TOO MUCH LIFE	+	--	+	+	--	--	+	--	--
RICH FOLKS	--	--	+	+	--	--	+	--	+
HUNGER	+	+	+	+	--	--	+	--	--
POPULATION	+	--	+	+	+	--	+	--	+
THE POOR	+	--	+	+	--	--	+	--	--
TOTAL	7/10	3/10	10/10	10/10	1/10	1/10	10/10	2/10	4/10

Table 4.5 Generic Structure Within FOCUSsing in the Texts on Population Growth.

4.5.1 SUGGESTION (SGN)

SUGGESTION contains an offer of an abstract means of overcoming problems. The message in SUGGESTION can be directed to anyone in a position to assume responsibility for solving such problems, be they individuals, scholars, or decision-makers. It involves a sense of the future because it concerns actions which are suggested as essential for a better future. The analysis reveals that the message in this element addresses itself to us as members of a community rather than as individuals. The semantic properties of this element are lexis concerning improvement, achievement, objectives, and the future. Lexicogrammatically, SUGGESTION is realised by modality: obligation and material processes, and, sometimes mental processes. SUGGESTION, RECOMMENDATION, and CALL FOR COLLABORATION all contain advice and therefore share common lexicogrammatical features. Semantically, however, they are different. SUGGESTION has higher ideational than interpersonal meaning in that it offers alternative ways to overcome problems, while RECOMMENDATION and CALL FOR COLLABORATION both emphasise interpersonal meaning. They tend to involve the

readers emotionally in the message. The end result that these elements seek is that specific action be taken. Examples of SUGGESTION are provided below:

Population

SUGGESTION (25)¹The implication of their statement is not that we should assume the outlook for sustainable development is hopeless, ²but rather that each nation individually, and all nations collectively, **should** begin now ³to **identify** ⁴and **introduce** the changes necessary ⁵to **achieve** it ⁶if we are to avoid costly--and possibly coercive-- action in the **future**.

⁷One change that **would enhance** the prospects for sustainable development across the globe **would** be a reduction in population growth rates.

China's People

SUGGESTION (4)...¹China's success offers fresh hopes for these impoverished countries, which likewise contain three-quarters of emergent regions' population. ²But these countries **would have to mobilise** the political capacity ³to implement something of the "fair shares for all" spirit which characterises China's approach to development. ⁴The political input need not necessarily be socialist of the extreme form practised in China. ⁵But developing countries **would** certainly **have to** try to **eliminate** the grosser forms of maldistribution of wealth and income between the top 10 per cent and the bottom 60 per cent (a more extreme disproportion in many cases than the United Kingdom or the United States). ⁶Otherwise the bottom sector remains impoverished--and resistant to family planning.

Rich folks

SUGGESTION (20)¹While people in rich nations **must shoulder** responsibility for civilization's resource depletion and environmental deterioration, ²they are also in a better position to lead the way in making the necessary changes ³to **improve** the human predicament. ⁴Still-growing populations, after decades of slackening growth, **could soon achieve** zero population growth ⁵and begin shrinking. ⁶Rather than lament the shift to an "older" population, people in developed countries **could celebrate** and **encourage** the **trend**. ⁷The smaller the population (P), of per-capita consumption or affluence (A) and technologies (T) remain the same, ⁸the less the environmental impact (I). ...

4.6 SEMANTIC ELEMENTS WITHIN CLOSING

The generic elements within CLOSING in the two sets of texts are set out in the tables below.

ELEMENT TEXT	SUM	CON	ANX	SPN	REC	COL
COLD	--	--	+	+	--	--
PARASOL	--	--	+	--	--	--
OZONE HOLE	--	--	--	+	--	--
METHANE	--	--	--	--	--	--
ICY	--	--	--	+	--	--
ALGAE	--	+	--	--	--	--
DRYING	--	--	+	--	--	+
HEAT	+	--	+	--	--	---
OZONE VANISHES	--	+	+	--	+	--
OZONE THINS	--	+	[SPN]	+	--	--
TOTAL	1/10	3/10	6/10	4/10	1/10	1/10

Table 4.6 Generic Elements Within CLOSING in the Climate Change Texts.

ELEMENT TEXT	SUM	CON	ANX	SPN	REC	COL
NUMBERS	--	[ANX]	+	--	--	--
MANY PEOPLE	--	+	--	--	--	--
TEN MYTHS	--	--	--	--	--	+
CHINA'S PEOPLE	--	+	--	--	--	--
POP. PATTERNS	--	+	--	--	--	+
TOO MUCH LIFE	--	+	--	--	+	--
RICH FOLKS	--	--	--	--	+	--
HUNGER	--	--	--	--	+	--
POPULATION	--	--	--	--	+	--
THE POOR	--	--	--	--	+	+
TOTAL	0/10	5/10	1/10	0/10	5/10	3/10

Table 4.7 Generic Structure Within CLOSING in the Population Growth Texts.

Tables 4.6 and 4.7 suggest some similarities and differences between CLOSING as it is found in the texts on climate change and population growth. My analysis revealed that there are combinations of the same elements within CLOSING in both sets of texts. As for the differences, the following observations flow from my analysis;

1. The climate change texts have a much higher number of ANXIETY elements than do the population growth texts; six out of ten, and one out of ten respectively.
2. The climate change texts have four instances of SPECULATION while no SPECULATION is found in the population growth texts.
3. Only one RECOMMENDATION is found in the climate change texts while five instances were found in the population growth texts.
4. Only one text on climate change has CALL FOR COLLABORATION whereas this element is found three times in the population growth texts.

The observations listed above reveal the semantic differences motivated by differences in *Field*. To get a better picture of the semantic differences, the issue will be discussed in detail in 4.12.

4.7 DEFORESTATION

4.7.1 Texts and their source

TEXT	SOURCE	CODE
Kill or cure? Remedies for the rainforest.	New Scientist, September 16, 1989.	Kill or cure?
The tropical chainsaw massacre	New Scientist, September 23, 1989.	Chainsaw
Jungle law in Thailand's forests	New Scientist, November 18, 1989.	Jungle law
Playing with fire	Time, September 18, 1989.	Fire
The making of an eco-disaster	Time, November 21, 1994.	Eco-disaster
Chain saws invade Eden	Time, August 29, 1994.	Eden
Make parks, not war	The Amicus Journal, Fall 1987.	Parks
What good are ancient forests?	The Amicus Journal, Winter 1990.	Ancient forests
South-east Asia's trembling rainforests	Our planet, Vol.3 (4), 1991.	Rainforests
Guardians of the forest	Our planet, Vol.7 (4), 1995.	Guardians

4.7.2 Synopsis of the texts

Kill or Cure? Remedies for the Rainforest (Kill or cure?)

Influential environmentalists argue that Western aid programs which finance dams, mines and other large projects destroy the environment and the cultures of people in the tropics, thereby undermining the planet's life support systems. They argue that developing countries ought not sell off their forests to buy expensive imports from developed nations. More conservative environmental groups argue instead that development agencies, such as the World Bank, ought make their policies more 'green'. While radical environmentalists argue for bans on logging virgin rainforests, claiming sustainable forestry to be a myth, their opponents believe this would be impossible to police and that forests must be managed. Currently, neither shifting cultivators nor forest departments manage forests sustainably. The development of other economically valuable forest products besides timber needs promoting.

The Tropical Chainsaw Massacre (Chainsaw)

While environmental campaigners call for the cessation of logging in rain forests aid agencies call for 'sustainable' forest management. The destruction of tropical forests is the century's greatest ecological disaster leading to mass extinctions, global warming, resource depletion, and the displacement of forest dwellers. Poorer countries have little choice but to pursue short-term gains by selling forests to alleviate national debt. Commercial logging is the driving force behind deforestation as it opens forests to other agents of change such as poor families which follow access roads, often under inappropriate government encouragement. The international trade in tropical timber has become the focus of environmental campaigns while those involved in the trade point to the damage which boycotts can do to poorer nations.

Jungle Law in Thailand's Forests (Jungle law)

Thailand's national parks are extensive, 4 per cent of the country is covered by wildlife sanctuaries, and nearly half of its remaining forests are in protected areas, however these mechanisms are failing to preserve the relatively small areas of remaining forest. Half a

century ago tropical forest dominated the landscape however timber is now in short supply. Pressure on remaining forests comes from population growth which forces farmers to spread uphill into uncultivated areas and from hill people from neighbouring countries who practice shifting cultivation. The government's commitment to implement conservation policies is lacking given other political and economic pressures. Despite the profusion of wildlife departments and laws they all remain under the Forestry Department which is also charged with encouraging forestry and logging.

Playing With Fire (Fire)

Increasing attention on deforestation in the Amazon has sparked a confrontation between industrial nations newly converted to environmental causes and poorer nations who see outside interference as an attack on their sovereignty. Deforestation in the Amazon by loggers, miners, and plantation interests is accelerating, threatening species diversity and possibly adding to global warming trends. This makes conservation of Amazonian rain forests a global issue. Road development by the government facilitates the opening of new land by farmers and ranchers who often soon abandon the unsuitable soils which are quickly exhausted. Environmentalists blame relationships between contractors and politicians for the large road and dam projects which increase environmental destruction. Botanists argue that sale of forest products in some regions would be more lucrative for the government as well as being more sustainable.

The Making of an Eco-Disaster (Eco-disaster)

In Madagascar, peasant farmers are converting rain forest to wasteland by clearing and then quickly abandoning the land which is low in nutrients. This threat to Madagascar's rich store of flora and fauna is being opposed by conservation groups who must counter the daunting reality of the daily struggle for survival by families who require timber for housing and cooking-fires. Linking conservation and development are difficult tasks for community workers however as high population growth puts great pressure on the land. Distrust of outsiders and of the government makes winning the confidence of remote villages difficult and adds to the problems of promoting alternative practices. Some

government officials realise the potential of ecotourism and the commercial exploitation of forest products for pharmaceutical purposes as means to protect flora and fauna.

Chain Saws Invade Eden (Eden)

Pristine rainforests in the sparsely populated South American country of Guyana are not safe despite their isolation. The governments of Guyana and Suriname have begun to open huge tracts of forest to timber companies from Korea, Indonesia and Malaysia, the same loggers who have ravaged forests in Southern Asia. Economic hardship and the attraction of logging revenue have made the forests in both countries vulnerable. International aid embargoes imposed on Suriname's repressive regime have led the government to degrade infrastructure and natural resources. International conservationists are trying to convince the two governments that a sustainable economic alternative to large-scale logging lies in the possibility of income from ecotourism and the development of pharmaceuticals from forest products.

Make Parks, Not War (Parks)

Nicaragua has the greatest percentage of intact ecosystems in Central America yet despite the implementation of impressive conservation measures by the Sandinista government since 1979 these areas are threatened by war, economic crisis and environmental destruction. Land reform has halted the colonisation of rain forests and foreign timber companies were banned from operating in 1979, but domestic logging, development projects, slash and burn agriculture, and fire wood cutting create severe environmental pressures for this poor country. The war also has indirect environmental impacts because the priority given defence spending. Co-operation between regional governments and recognition of common concerns in their rich but threatened environments has seen the establishment by Nicaragua and Costa Rica of a 'peace park'; an international demilitarised biosphere in the tropical rain forest on their border.

What Good are Ancient Forests? (Ancient forests)

Brazil and seven other South American countries have denounced foreign interference on the issue of preserving tropical rain forests which they share. Many Americans do not realise that the Pacific Northwest of America is also suffering the destruction of forest ecosystems. The influential American timber industry which employs large numbers and brings enormous income to the Northwest's economy is facing increasing public opposition as the extent of forest destruction is becoming known. Forest species will face extinction and forest functions such as cleansing pollutants from the air, forestalling greenhouse warming and preventing erosion may be lost. Genetic as well as aesthetic value in forests provide powerful argument for their conservation as opposed to the economic concerns of the timber industry. Disputes over the fate of forests contrast different values and views of the future and need input from commerce, environmentalists, states and local communities for their resolution remembering that the fate of forests is a global, not a regional issue.

Southeast Asia's Trembling Rainforests (Rainforests)

In many Southeast Asian countries population pressure drives peasants to farm unsustainably in forest watersheds (Philippines and Vietnam), peasant farmers compete with land hungry commercial plantation developers (Thailand), and logging companies are increasingly moving into virgin rainforests in Borneo. Experts believe that massive deforestation can only be reversed by restructuring rural administration and reordering national and global economic priorities. At least 24 million farmers practice shifting cultivation in upland forest areas in Southeast Asia and their numbers are increasing rapidly. NGOs are taking a lead in forest management issues in Thailand however wealthy elite with commercial logging interests influence government policy while Governments in the region lack trained personnel to oversee forest management policy.

Guardians of the Forest (Guardians)

Today only 4 per cent of the original forest cover of the coastal plains and hill ranges of Ecuador still exists. Its recuperation is vital for the long term survival of the

communities in the region. The greatest forest devastation has occurred over the last several decades due to extension of the road system, population growth, and the surging demand for resources which has caused indiscriminate forest destruction. Deforestation has caused changes in local climate, namely prolonged drought leading to desertification. Threats to the local economy also threaten national security as deterioration of the quality of life is causing rural-urban migration. Community development projects are beginning to emphasise environmental education and ecotourism as well as running forestry training courses. These projects give priority to river basins and headwaters. Community projects which preserve forests, and fauna will restore traditional cultural values also.

4.8 GENERIC STRUCTURE

I would argue that the above analysis of generic structure utilising the characterisation of semantic elements demonstrates that the proposed GSP can be successfully applied to account for the structure of the texts on population growth. The same method of GSP description was found to work equally well for the analysis of deforestation texts, which is tabulated in Table 4.8.

TEXT		TUNING				FOCUSSING																CLOSING										
KILL CURE?	OR	TTL	GLM	SET [PRB]	BRG	EVN	SLN	EVN	SPC1	CNS	SGN	SPC2	BRG	EVN	CNS	BRG	SLN	GCL	SPC 3	EVN	BRG	SLN [EVN]	CON	REC								
CHAINSAW		TTL	GLM	SET	PRB	BRG	SLN	BRG	SLN	SGN	SPC 1	BRG	EVN	BRG [EVN] [SLN] [EVN] ANX	SLN	EVN	ONP	SLN	CON													
JUNGLE LAW		TTL	GLM	SET	PRB	BRG [EVN]	SLN [EVN] [EVN]	BRG	ONP	SGN	EVN	BRG	CON																			
FIRE		TTL	GLM	[PRO]	PRB	BRG	PRE	CNS	BRG	SPC1	BRG	CNS	BRG	EVN	BRG	CNS	SLN	EVN	BRG	PRE	BRG	EVN	BRG	CNS	BRG	PRE	SGN	EVN	BRG	SGN [SPC2]	ANX	COL
ECO-DISASTER		TTL	GLM	SET	PRB	BRG	CNS	ONP	SLN	EVN	BRG	PRE	ANX [SPN]																			
EDEN		TTL	GLM	SET	PRB	BRG	PRE	SGN	CON	REC																						
PARKS		TTL	GLM	PRB	BRG	PRE	BRG	SLN	EVN	ONP	PRE	BRG [SPC 1] [EVN]	ONP	SLN	EVN	SLN	BRG	SLN [PRE]	SLN	EVN	SLN	EVN	BRG	SLN	SGN	REC						
ANCIENT FORESTS		TTL	GLM	SET	THR	PRB	BRG	PRE	BRG	EVN	BRG	SGN	PRE	BRG	REC	CON																
RAIN-FORESTS		TTL	SET	PRB	BRG	PRE	BRG	SLN	BRG	PRE [EVN]	BRG	SPC1	BRG	SPC 2	BRG	SLN	BRG	SLN	SGN	CON												
GUARDIANS		TTL	SET	PRB	BRG	SPC 1	BRG	SLN	CON																							

Table 4. 8 The Actual Generic Structure of Texts on Deforestation. N.B. [.....] denotes embedded elements.

Tables 4.1 and 4.8 and 3.23 indicate a high degree of compatibility of GSP among the three sets of texts. At a high level of abstraction, the texts on deforestation manifest the same global GSP structure (TUNING, FOCUSSING, and CLOSING) as that found in the texts on climate change and population growth. At a lower level of abstraction, the generic elements found in the climate change and the population growth texts are also found in the deforestation texts.

4.9 SEMANTIC ELEMENTS WITHIN TUNING

Table 4.9 presents the actual semantic elements within TUNING for all ten texts on deforestation.

ELEMENT TEXT	TTL	GLM	SET	PRO	THR	PRB	TLI
KILL OR CURE?	+	+	+ [PRB]	--	--	+	--
CHAINSAW	+	+	+	--	--	+	--
JUNGLE LAW	+	+	--	--	--	+	--
FIRE	+	+	--	+	--	+	--
ECO- DISASTER	+	+	+	--	--	+	--
EDEN	+	+	+	--	--	+	--
PARKS	+	+	+	--	--	+	--
ANCIENT FORESTS	+	+	+	--	+	+	--
RAINFOREST	+	--	+	--	--	+	--
GUARDIANS	+	--	+	--	--	+	--
TOTAL	10/10	8/10	8/10	1/10	1/10	10/10	0/10

Table 4.9 Generic Elements within TUNING in Deforestation Texts.

Table 4.9 reveals that a dominant majority of the sample texts on deforestation provide the readers with a combination of four elements, namely, TITLE, GLIMPSE, SETTING, and PROBLEM. One text has PROBLEM embedded in SETTING. One has PROPHECY and one text includes THREAT as part of the contextualisation. TECHNICAL LEAD-IN does not appear in any deforestation texts.

4.10 SEMANTIC ELEMENTS WITHIN FOCUSsing

As suggested in Table 4.10, the texts on deforestation all have the same generic elements as those found in the first two sets of texts. However, there are some variations concerning the frequency of the elements occurring in the texts. It can be clearly seen that GENERAL CLAIM appears in one text only while SOLUTION and SUGGESTION appear in eight and seven of the texts respectively. The number of PREDICTION elements is not as high as that in the climate change and the population growth texts. Yet, the lower number of instances of PREDICTION does not imply a lower sense of futurism. On the contrary, futurism is still shown to be of crucial significance in the deforestation texts when we consider other elements exhibiting ‘irrealis’ aspects. These other elements include SUGGESTION (which appears to occur most frequently among the three sets of texts), and CONCERNS; however, the presence of SUGGESTION rather than PREDICTION shows that the deforestation texts deal with a different kind of futurism.

ELEMENT TEXT	SPC	GCL	BRG	EVN	ONP	SLN	PRE	CNS	SGN
KILL OR CURE?	+	+	+	+	--	+	--	+	--
CHAINSAW	+	--	+	+	+	+	--	--	+
JUNGLE LAW	+	--	+	+	+	+	--	--	+
FIRE	+	--	+	+	--	+	+	+	+
ECO-DISASTER	--	--	+	+	+	+	+	+	--
EDEN	--	--	+	--	--	--	+	--	+
PARKS	+	--	+	+	+	+	+	--	+
ANCIENT FORESTS	--	--	+	+	--	--	+	--	+
RAINFOREST	+	--	+	+	--	+	+	--	+
GUARDIANS	+	--	+	--	--	+	--	--	--
TOTAL	7/10	1/10	10/10	8/10	4/10	8/10	6/10	3/10	7/10

Table 4.10 Generic Elements Within FOCUSsing in Deforestation Texts

4.11 SEMANTIC ELEMENTS WITHIN CLOSING

Table 4.11 displays the generic elements found in CLOSING in the texts on deforestation. Approximately half of the texts possess a combination of elements

within CLOSING while the other half displays single-element CLOSING. CONCLUSION is the element most frequently used in the texts (seven instances) and RECOMMENDATION is the element used second most frequently (four instances). ANXIETY appears in three texts, CALL FOR COLLABORATION in two, SPECULATION in one, and SUMMARY none. These findings distinguish the semantics of the deforestation texts from the climate change and the population growth texts. The differences in the semantics are discussed in 4.12.

ELEMENT TEXT	SUM	CON	ANX	SPN	REC	COL
KILL OR CURE?	--	+	--	--	+	--
CHAINSAW	--	+	--	--	--	--
JUNGLE LAW	--	+	+	--	--	--
FIRE	--	--	+	--	--	+
ECO-DISASTER	--	--	[SPN]	+	--	--
EDEN	--	+	--	--	+	--
PARKS	--	--	--	--	+	+
ANCIENT FORESTS	--	+	--	--	+	--
RAINFOREST	--	+	--	--	--	--
GUARDIANS	--	+	--	--	--	--
TOTAL	0/10	7/10	3/10	1/10	4/10	2/10

Table 4.11 Generic Elements Within CLOSING in Deforestation Texts.

The analytical components described so far are the generic structure and the semantic elements of the texts on population growth and deforestation. It was argued that the proposed GSP description was applied equally successfully to the climate change texts and, subsequently, to the texts on population growth and deforestation. At a high level of abstraction, the three sets of texts share the same global generic shape. At the semantic level, the degree of similarity is very high, that is, all of the semantic elements were found useful in accounting for all three sets of texts, although the sequencing of the elements differed. However, when we moved to a closer examination of the actual generic structure of the three sets of texts, some internal variations between generic elements were found. These variations, which help to account for the semantic differences among the three sets of texts, will now be considered.

4.12 THE CONSEQUENCES OF SEMANTIC VARIATIONS FOR GSP CHARACTERISATION

A comparison of the semantic elements of the texts in all three different environmental issues supports the idea that genre or register is best tied in at the same level as context of situation, as suggested Halliday and Hasan (op.cit.). The comparison in this study shows that the semantics of the three sets of texts vary from each other to a certain degree, even though the contextual variables appear constant as regards subject matter. That is, if *field* is limited to environmental issues, the focus of *tenor* is on uninformed readers (their relationship is one of an expert talking to non-experts or the general public), and *mode* is limited to the facts of magazine articles (graphic and constitutive of the context. Note also the use of spoken/direct quotation as discussed in chapter three).

Semantic variations show the different qualities of the three issues, viz. the climate change texts are the most abstract and contentious, the deforestation texts are the most concrete and least contentious, and the population growth texts are relatively concrete but still controversial. Figure 4.2 schematises these qualities.

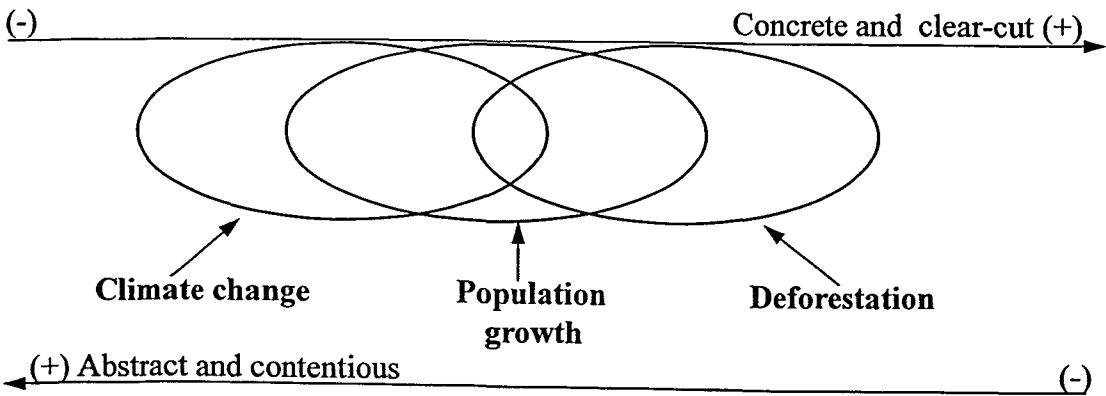


Figure 4.2 Quantitative Variations within and between Climate Change, Population Growth, and Deforestation Issues.

The notions of 'abstract' and 'concrete' demand some clarification here. Climate change, population growth, and deforestation issues involve abstract processes such as

increases in temperature, the projection of population growth rates, and the deterioration of forests. However, among the three of them, climate change issues are considered by this study to be the most abstract because they involve scientific concepts and activities which ordinary people do not deal with in everyday life. Lay readers require a significant amount of background information from experts to understand the concepts behind these (often) invisible processes. Examples of the abstract concepts involved are that ozone depletion is caused by chlorine atoms attacking ozone molecules, or increases in CO₂ emissions which cause global temperatures to rise. Conversely, the concepts behind population growth and deforestation appear to be more concrete. Laypersons are more able to conceptualise the idea of population growth and see the results. They do not need to conduct laboratory experiments in order to get the picture of an increasing population. Statistics showing population numbers at a certain point in time are sufficient to provide a degree of understanding of the issue. Similarly, the process of deforestation is quite transparent. Deforestation means the destruction of trees which may result in drought, flooding, soil erosion etc. The physical damage has already been done and is visible, and populations have long experienced and understood these consequences without relying on scientific information. They can refer the uncommon sense of science to the common sense of their own experience, observation, and local community report.

The brief description, above, of the varied nature of the issues in the sets of text, goes some way to establishing the basis of semantic variation. This section illuminates how the context of situation motivates the generic shape of the texts by comparing the generic elements of the three sets of texts. For the purposes of comparison, the occurrence of generic elements in all three sets of texts is summarised in Table 4.12.

GLOBAL ELEMENT	ELEMENT	CLIMATE CHANGE	POPULATION GROWTH	DEFORESTATION
TUNING	TITLE	10	10	10
	GLIMPSE	9	10	8
	SETTING	5	1	7
	PROPHECY	1	1	1
	THREAT	1	3	1
	PROBLEM	10	10	10
	TECHNICAL LEAD-IN	2	1	0
FOCUSSING	SPECIFIC CLAIM	10	7	7
	GENERAL CLAIM	4	3	1
	BRIDGING	10	10	10
	EVALUATION	9	10	8
	ONGOING PROJECT	2	1	3
	SOLUTION	4	1	7
	PREDICTION	7	10	4
	CONCERNS	2	1	3
	SUGGESTION	0	4	6
CLOSING	SUMMARY	1	0	0
	CONCLUSION	3	5	7
	ANXIETY	6	1	3
	SPECULATION	4	0	1
	RECOMMENDATION	1	5	4
	CALL FOR COLLABORATION	1	3	2

Table 4.12 Comparison of Generic Elements Displayed in the Three Sets of Texts.

A cross-issue comparison of TUNING reveals that its elements are commonly found, and are relatively even in frequency across the three sets of texts: they contain both obligatory and optional elements. Every text has TITLE and PROBLEM and most have GLIMPSE. It is significant that, as part of the process of contextualising the facts for the readers, the deforestation texts contains the highest number of SETTING elements, while the population growth texts contain the lowest (seven and one out of ten respectively). There are three THREATs in the population growth texts whereas only one THREAT is found in each of the climate change and the deforestation texts. Each set of texts has only one PROPHECY.

Within SETTING, one can notice differences in how the meaning is conveyed. SETTING in both the climate change and the deforestation texts deals mainly with places, while SETTING in the population growth texts deals with a brief history of

population growth. SETTING functions to provide the readers with sufficient background to understand the main argument that will follow. While SETTING in the deforestation and the population growth texts can lead the readers directly to the main argument, SETTING in climate change issues cannot. In other words, the readers of the deforestation texts are able to make a connection between what was said in SETTING and the main argument; scenarios of either lush or destroyed forests facilitate the reader's immediate understanding of the point the writer will make. On the other hand, SETTING in the climate change texts, will not necessarily enable the readers to fully grasp the concept presented in the main argument. Compare the three SETTINGS below which demonstrate the point.

Rainforests

SETTING (1) ¹Bulldozers and logging trucks roll into the virgin forests of Borneo in increasing numbers. ²Villagers eking a living from the fringes of vanishing forests in Thailand are in conflict with land-hungry commercial plantation developers. ³Desperation in over-populated Philippines and Vietnam drives peasants to encroach further upon forested watersheds, ⁴further undermining ecological stability.

Heat

SETTING (1) ¹At this time of year, the Cabo de Hornos Hotel in Puntas Arenas (pop.100,000) is ordinarily filled with tourists who spend their days browsing in the local tax-free shops or mounting expeditions into the rugged mountainous countryside just out of town. ²But the 120 mostly American scientists and technician who converged on Chile's southernmost city for most of August and September ignored advertisements for hunting, hiking and ski tours. ³Instead each day they scanned the bulletin board in the hotel lobby for the latest information on a different sort of venture.

(2) ⁴Thirteen times during their eight-week stay, a specially outfitted DC-8 took off from the President Ibañez Airport, twelve miles northeast of Puntas Arenas. ⁵Often the 40-odd scientists and support crew listed for a given flight had to leave the hotel soon after midnight to prepare the plane and its research instruments. ⁶Once airborne, the DC-8 would bank south toward Antarctica, 1000 miles away, ⁷fighting vicious winds before settling into a twelve-hour round-trip flight at altitudes of up to 40,000 ft. ⁸Along the way, the instruments continuously collected data on atmospheric gases, airborne particles and solar radiation high above the frozen continent. ⁹Meantime, parallel flights took off from Ibañez to gather additional atmospheric data at nearly twice the altitude. ¹⁰Manned by a lone pilot, a Lockheed ER-2, the research version of the high-altitude U-2 spy plane, made twelve sorties into the lower stratosphere, ¹¹cruising at nearly 70,000 ft., or more than 13 miles, for six hours at a time.

(3) ¹²Both aircraft were part of an unprecedented, \$10 million scientific mission carried out under the combined sponsorship of NASA, the National Oceanic and Atmospheric Administration, the National Science Foundation and the Chemical Manufacturers Association. ¹³The purpose: to find out why the layer of ozone gas in the upper atmosphere,

which protects the earth from lethal solar ultraviolet radiation was badly depleted over Antarctica. ¹⁴The scale of the mission reflected an intensifying push to understand the detailed dynamics of potentially disastrous changes in the climate.

Population

SETTING (1) ¹For thousands of years, the world's human population grew at a snail's pace. ²It took over a million years to reach 1 billion people at the beginning of the last century. ³But then the pace quickened. ⁴The second billion was added in 130 years, the third in 30, and the fourth in 15. ⁵The current total is some 5.4 billion people.

There is a noticeable difference between the form that SETTING takes in the three extracts. SETTING in the 'Rainforest' text deals directly with the central issue of deforestation, and in the 'Population' text talks specifically about population growth. However, in the 'Heat' text SETTING can only deal with the location and NASA's mission in order to introduce the issue of ozone depletion and the greenhouse effect and cannot begin to deal directly with ozone depletion and greenhouse issues.

The reasons for this lie in the nature of the three issues. Deforestation issues, for example, are demonstrably the most concrete as already discussed above. Global warming, the issue most publicised among climate change issues, is the most abstract. Its process are invisible and consequently, when the writer wants to prepare the readers for the subsequent parts of the text, s/he can do little more than describe the physical location where the experiment or the project is taking place as opposed to the actual site of global warming processes. The population growth issue, on the other hand, is less abstract than the climate change issue because to show population growth rates, statisticians can simply extrapolate from hard data.

The next point of comparison is the respective use of THREAT and PROPHECY. Given that a negative view of the future is inherent in these two elements¹, they can be

¹ THREAT deals with **what** may happen in the future while PROPHECY deals with **when** something may happen.

considered together. At the same time these elements are distinguishable semantically dependent on whether they are present in the population growth texts or texts on climate change and deforestation. Table 4.12 shows that the incidence of THREAT in the texts on population growth is slightly higher than in the other two sets of texts. Writers indicate greater certainty about the prospects of overpopulation and its global impact, and are therefore confident enough to begin the article with such disturbing information as “overpopulation on the earth will lead to starvation and death because there will not be enough food”. It can be argued here that the nature of the issue, or the ‘context of situation’ has a strong influence on how the meaning of the text is constructed. This can be seen from the relationship between the frequency of use of THREAT and PROPHECY in TUNING, and of RECOMMENDATION and CALL FOR COLLABORATION elements in CLOSING. In most cases where RECOMMENDATION or CALL FOR COLLABORATION is present they follow a prior THREAT or PROPHECY and this combination of elements is a critical device in the writer’s call for action. RECOMMENDATION and CALL FOR COLLABORATION can also be seen together as elements demanding some action². The number of THREAT and PROPHECY elements is proportional to the number of RECOMMENDATION and CALL FOR COLLABORATION.

As noted in chapter three, the four elements, THREAT, PROPHECY, RECOMMENDATION, and CALL FOR COLLABORATION have high interpersonal value. It may also be argued that writers utilise THREAT and PROPHECY strategically to reinforce the message in RECOMMENDATION and CALL FOR COLLABORATION. In this way RECOMMENDATION and CALL FOR COLLABORATION are given added impact. That is, THREAT and PROPHECY perform the function of instilling fear in the readers, and RECOMMENDATION and CALL FOR COLLABORATION function as demands for action. The proportion of

² RECOMMENDATION is the message directed to decision-makers whereas the message in CALL FOR COLLABORATION is addressed to individuals as members of a community.


‘fear instilling’ messages to ‘demand for action’ messages is fairly even across the texts; two to two (100%), four to nine (44.4%), and two to five (40%) in the climate change, population growth, and deforestation texts respectively. The nature of the three issues appears to determine these results. While there are far fewer instances of RECOMMENDATION and CALL FOR COLLABORATION in climate change texts (two as opposed to nine and five respectively in the texts on population growth and deforestation) the proportion of THREAT and PROPHECY in these instances is much greater in texts on climate change (100% as opposed to 44.4% and 40% respectively).

The uncertainties surrounding the impact of global warming limit the writer’s urge to overemphasise its possible dire consequences. It follows that s/he cannot make strong demands for action because in the absence of adequate concrete evidence to convince the readers, such demands lack persuasiveness. The much greater proportion of THREAT and PROPHECY probably reflect the reality that when RECOMMENDATIONS and CALLS FOR COLLABORATION are made on climate change issues they are usually only supportable by alarmist speculation rather than hard scientific data. Unlike many aspects of climate change issues, the impacts of overpopulation and deforestation have already been felt. This is reflected in texts on population growth and deforestation containing more RECOMMENDATIONS and CALL FOR COLLABORATION than texts on climate change. The physical processes of degradation resulting from population pressure and deforestation mean that “collective action is indispensable by informal movements and/or the formal institutions” at all levels (Galtung and Vincent 1992: 170).

Although the climate change texts do not utilise the strategy of alarming the readers as often, in absolute terms, as in the other two issues, this does not mean that threatening aspects are absent. Instead, they are expressed in other elements in which the ‘threat’ aspect is not inherent in the label of the elements. As shown in Table 4.13, negative affectual meaning is also found in TITLE, GLIMPSE, SETTING, and PROBLEM.

GSP ELEMENT	CLIMATE CHANGE	POPULATION GROWTH	DEFORESTATION
TITLE	5	1	2
GLIMPSE	6	5	4
SETTING	1	0	4
PROPHECY	1	1	1
THREAT	1	2	1
PROBLEM	6	5	7
TECHNICAL LEAD-IN	0	1	

Table 4.13 Comparison of Negative Affectual Meaning in Elements within TUNING.

 Elements not found.

FOCUSSING is another area in which semantic variations reflect the different inherent qualities of the three sets of texts. Here the focal points are SPECIFIC CLAIM, GENERAL CLAIM, BRIDGING, SOLUTION, and ‘irrealis’ elements (PREDICTION, CONCERNS, and SUGGESTION).

SPECIFIC CLAIM and GENERAL CLAIM are elements that contain the evidence which the writer uses to support his/her argument³. It is a form of expert testimony that science popularisation needs. Corner and Richardson note (1993:224-225) that

“the coverage of many environmental topics requires the testimony of experts, the voice of science (and technology) to explain the complexity of cause-effect relationships, both those designed to be under human control and those which, like the greenhouse effect, are happening as an unplanned consequence of human activity.”

³ SPECIFIC CLAIM concerns research reports of certain scientists. Their names and attributions are provided, for example, “Notes Sherwood Rowland, a chemist at the University of California.” GENERAL CLAIM also concerns research reports of scientists but the scientists are cited as collective body, for example, “Climatologists estimated that ...”.

My analysis reveals that the climate change texts have a higher number of SPECIFIC CLAIM and GENERAL CLAIM elements than the other two sets of the texts. It can be argued that this result indicates that the climate change issue is more abstract and contentious. Because it is abstract, the writer must provide adequate scientific evidence as part of the explanation so that the readers become clear about what global warming is. Citing several research findings gives a sense of dialogism. The effect of the dialogism on the readers is that they genuinely experience a debate about “whether global warming is occurring?” or “whether sea levels will rise or fall?”. In the population growth and the deforestation texts on the other hand, SPECIFIC CLAIMs and GENERAL CLAIMs, where found, were usually in agreement. The introduction of these two elements provides a different dialogic effect, that is, a similar opinion from different researchers. Furthermore, the lower the frequency of SPECIFIC CLAIMs and GENERAL CLAIMs in the population growth and the deforestation texts may be - again - because the two issues are more clear-cut. The writer does not have to support his/her viewpoint with many research reports. What is necessary instead is an explanation of what has happened, when, where, and why. Accordingly, the population growth and the deforestation texts have a lower frequency of SPECIFIC CLAIM and GENERAL CLAIM than BRIDGING.

A closer look at what BRIDGING contains across the three topics shows a degree of semantic difference. BRIDGING is the element in which technical information is provided to the readers as a basis for their understanding of the main argument in the text. BRIDGING is the fundamental component of any text. Its form and style of presentation is similar to that found in textbooks. In other words, it shows some degree of intertextuality. In a study of junior-secondary science and humanities textbooks, Martin (1993:222) categorised texts according to their function and found that descriptive texts give an account of things *as they are* while explanatory texts give a reasoned account of *why things are*. Both science and humanities texts appear to be either descriptive or explanatory. No text in my analysis is either purely descriptive or purely explanatory. BRIDGING contains a combination of descriptive

and explanatory components. Fuller (1995:22) states that popular science “unlike science textbooks is not a stepping stone to the specific discursive practices of science”, however my analysis establishes that BRIDGING is indeed a stepping stone which enables the reader to develop their scientific literacy.

It was found that ‘Natural world entities’ (greenhouse gases, ozone layer, and atmosphere) and ‘Natural world processes’ (the trend of ozone depletion, greenhouse effect, the rise and fall of sea levels) are foregrounded in most BRIDGINGS found in the climate change texts. By comparison, although these types of entities and processes (fertile croplands, food supply, and ‘carrying capacity’) are commonly found in BRIDGINGS in the population growth and deforestation texts, these two sets of texts are more commonly characterised by descriptions of events in which space and time are thematised. Examples are;

1. *“In 1975 in countries such as India, ... and Latin American nations, over 40 per cent of the population is under 15 years of age.”* (Pop. patterns)
2. *“The developing world has made enormous economic progress over the past three decades...”* (Population)
3. *“In peninsular Malaysia, 95% of deforestation is under control of the Government ...”, ...* (Rainforest)

Two elements in FOCUSsing can be considered as having ‘realis’ quality: ONGOING PROJECT and SOLUTION. ONGOING PROJECT outlines just that while SOLUTION comprises an element which informs the readers of any actions or remedies that have been undertaken in order to solve the problem. PREDICTION, CONCERNS, and SUGGESTION are the three ‘irrealis’ elements found in FOCUSsing. The notion of ‘future’ is expressed in the label of the elements. PREDICTION deals specifically with forecasting the future in relation to the three issues, while CONCERNS shows the writer’s apprehension about the future as it may be affected by phenomena related to climate change, population growth, and

deforestation. SUGGESTION, as we can see from the label, involves plans, objectives, alternative ways to deal with problems, and goals to be obtained; all of these aspects then deal with the idea of 'futureness'.

It has been shown in the above discussion that the population growth and the deforestation issues appear more clear-cut than the climate change issue and, thus, this distinction motivates the generic structure of the texts. It can be further argued that even though the issues of deforestation and population growth are similar in their nature, semantic variations can still be found in the texts which deal with them. This observation is supported by the fact that the two issues exhibit different degrees of the presence of 'realis' and 'irrealis' elements. Table 4.12 shows that the total number (ten) of 'realis' elements contained within ONGOING PROJECT and SOLUTION in the deforestation texts is almost double that found in the climate change texts (six) and five times that found in the population growth texts (two). This appears to reflect the fact that the causes and consequences of deforestation are so visible that people can no longer argue that 'something' has not yet happened. As a result, many remedial measures (may) have already been taken.

By comparison, the population growth issue appears far more clear-cut and definite than the climate change issue, reflected by the presence of a very high incidence of PREDICTION (ten out of ten) in population growth texts. Although all three sets of texts contain PREDICTION, the meanings of PREDICTIONS are different. The differences are motivated by the methods of prediction. Scientists must base their predictions about climate change upon the results of computer modelling. They cannot conduct laboratory experiments on processes occurring in the atmosphere, the ocean, and on land and so other scientific methods such as studying fossils or polar ice sheets have been used. This means that a number of uncertainties are built into the models used for prediction. There are many factors involved in making predictions and one factor may affect others. For example, CO₂ is not the only greenhouse gas that causes an increase in global temperatures, and CO₂ is produced from a great deal of sources

all over the world. Moreover, some research findings contradict one another, for example, some argue that the increase in temperatures will cause polar ice sheets to melt while others argue that polar ice sheets will expand in the warm temperature, as is argued in the 'Icy' text. Thus, many uncertainties come into play when the scientists make predictions about climate change, especially about its consequences. These uncertainties in making predictions are reflected in the lexicogrammatical features of PREDICTION in the climate change texts, that is, only low or median value modality: probability is selected. Yet, one cannot say that low or median value modality alone indicates a lack of confidence in making predictions because PREDICTIONS in the population growth and the deforestation texts use low and median value modality as well. Another indicator, which is crucial, is the semantics -- it is quite common to find that the writers of the climate change texts tend to show some reservations when they forecast the future impact of global warming. Examples are:

1. *"By 2050 if the present rate of burning fuels continues, that concentration will double trapping progressively more infrared radiation in the atmosphere."* (Heat)
2. *"Estimates released last week by the United Nations Environment Program predict a 26% rise in the incidence of nonmelanoma skin cancers worldwide if overall ozone levels drop 10%".* (Ozone vanishes)

My analysis notes that this does not seem to be the case with PREDICTIONS in the population growth and the deforestation texts, as shown in the following examples where less reservation in the use of semantics is exhibited.

Population growth

1. *The population giants of the world are India and China. By the year 2000, one in six of the Earth's inhabitants could be Indian, one in six Chinese. The history of mankind is likely to be shaped by the ability of these countries to control their growth of numbers.* (Pop. patterns)

2. *Today, their number approaches 1 billion. And the World Bank estimates that it is likely to increased further--by nearly 100 million--in this decade.*
(Population)

Deforestation

1. *At current rates of logging, all unprotected ancient forest in western Washington and Oregon will be gone by the year 2023. ...* (Ancient forests)
2. *They concluded that Asia and Africa together were likely to see a significant net reduction in forest cover between 1990 and 2050 ...* (Rainforests)

The examples show that PREDICTIONS in the population growth texts are more concretely based and as a result they are more convincing. This may be because the predictions or projections about population numbers are the result of an extrapolation calculated from the previous population number. Statisticians or demographers calculate the existing rate of population growth using only two factors, birth rate and death rate. As with PREDICTIONS in the population growth texts, PREDICTION in the deforestation texts is quite straightforward because two major factors, viz. planting and cutting trees, are used to predict the number of trees left in the forests. PREDICTION in the deforestation texts also provides a prospect of remedial actions, for instance, how many trees a country will have after trees are replanted according to set objectives.

It can be seen that the writers of population growth articles spend much time and space in FOCUSING to provide readers a picture of future population numbers. Once the writers have justified their ideas on (alarming) human population numbers, they can then give advice on how the problems ought to be solved. This is why the number of PREDICTION elements in the population growth texts is very high, while that of SUGGESTION is comparatively low. This argument can be further supported by the fact that RECOMMENDATION and CALL FOR COLLABORATION in the population growth texts have the highest incidence among all three issues. If writers

provide advice before they have sufficient evidence to support their case, the advice would not be convincing or not be comprehensible.

Other evidence showing that the context of a situation motivates the shape of a text is in SOLUTION. The population growth and the deforestation texts contain different 'numbers' of SOLUTION elements even though they are otherwise quite similar in terms of their processes being clear-cut and less complicated as the climate change issue. The frequency with which the SOLUTION element appears in the deforestation texts is far greater than that in the population growth texts (six and one out of ten respectively). However, the numbers of occurrences of SUGGESTION in the two sets of texts are almost equal, six occur in the deforestation texts, and four in the population growth texts. This suggests that although the writers on both issues can provide the readers with convincing predictive propositions and give advice on how to overcome problems, much action taken in relation to deforestation has been taken as a response to proposed SOLUTIONs. It is not technically difficult to provide plans and advice on how to solve population problems, but it can be very difficult to implement them. Both issues involve ideological factors, but solving population problems involves many factors such as politics, economics, and religion. They are the problems that exist both at the international scale and the grass roots level.

Texts on population issue confirm that the belief of many is that the problems reside in Third World countries; that poor people have too many children. People in affluent countries often consider that having many children to be a cost burden and they are often ignorant of the fact that in developing countries having many children means having enough labour to contribute to the family farm or other enterprise. Introducing contraception faces the problem of possibly being counter to personal, cultural or religious beliefs and is often hamstrung by political and administrative malaise. On the contrary, solving problems of deforestation does not necessarily involve changing people's religious beliefs. It is predominantly an economic issue as despite cultural practices, people usually respond well and quickly to any changes that will bring them

a better way of life. The ideological factors behind the two issues is also reflected in the different number of occurrences of RECOMMENDATION and CALL FOR COLLABORATION. Solving population problems needs co-operation at national, international and individual levels. This is evidenced by the fact that the numbers of RECOMMENDATION and CALL FOR COLLABORATION are almost equal. However, the key to solving such a social and economic problem as deforestation resides more with decision makers than with individuals. That is why in the deforestation texts the incidence of RECOMMENDATION elements is higher than that of CALL FOR COLLABORATION.

In CLOSING, we note that while the texts on population growth and deforestation exhibit a higher number of elements demanding action than do texts on climate change, the latter contain a higher number of ANXIETY, and SPECULATION elements. This may be because scientists still cannot produce congruent research findings to support the idea that global warming is taking place, or that climate change and natural disasters are caused by the greenhouse effect. Despite this, the possibly dire consequences of the greenhouse effect appear unavoidable if global warming occurs in fact. Consequently, writers on climate change texts appear more anxious about the future or at least this is what their texts indicate. Furthermore, as already mentioned above, the degree of uncertainty about future global temperatures is high, and this is reflected in the textual function of SPECULATION, which recapitulates on the ideas in PREDICTION. A very small number of elements call for action, we find one RECOMMENDATION and one CALL FOR COLLABORATION. It is noticeable that the meanings of these two elements in the texts on climate change differ from those where they appear in texts on population growth and deforestation. It is true that the illocutionary force of the two elements comprises a demand for action from 'anybody' to improve the situation, yet, in the climate change texts, 'action' means scientific activity. In other words, the message is oriented towards the scientific community, as shown in the extracts below.

Ozone vanishes

RECOMMENDATION (28)¹World leaders should remember ozone ²when they think about other threats to the planet. ³If they always wait until there is indisputable evidence that serious damage is occurring, ⁴it may be much too late to halt the damage. ⁵Consider the widespread scientific predictions of global warming from the *greenhouse effect*. ⁶No one knows that anything terrible will happen. ⁷But humanity has boosted the amount of carbon dioxide in the atmosphere by at least 25%. ⁸It is reckless to subject nature to such giant experiments ⁹when the outcome is unknown ¹⁰and the possible consequences are too frightening to contemplate.

Drying

CALL FOR COLLABORATION (22) ...¹So it is vital ²that we keep track of tropical temperatures ³and watch how they change. ⁴Surface temperatures are being monitored around the world, ⁵and satellites can now provide a global picture of temperature change at different levels in the atmosphere. ⁶The planet is likely to be slow to warm, ⁷but once warmed is likely to be difficult to cool. ⁸It would be wise to bear this in mind ⁹when deciding how we should curb our emissions of greenhouse gases.

Compared with these two last cited examples, there is a marked difference in the tone of the **RECOMMENDATION** and **CALL FOR COLLABORATION** elements in the population growth and the deforestation texts. The latter contain a stronger appeal to our sense of moral justice; for example, the call is to industrialised countries to reduce their disproportionate propensity to consume and pollute and to do something to help the less developed countries in a way that will help improve their standards of living. Examples of other aspects to our sense of humanity are provided below.

Too much life

RECOMMENDATION ¹But in the medium to long term, reducing population growth can have a very significant impact. ²To achieve this, governments, development agencies and donors of aid must focus their attention on enhancing the rights, education and health of women and children. ³This will improve both the health of people and the environment. ⁴And precisely because it takes so long, ⁵action must start right now.

Fire

CALL FOR COLLABORATION ¹The Amazon may run through South America, ²but the responsibility for saving the rainforests, as well as the reward for succeeding, belongs to everyone.

Examination of the twenty-two semantic elements in all three of the analysed texts found a total of nine elements that suggest 'irrealis'. Even though all nine elements concern futurism, it would be distorting to label them as one element because they convey slightly different shades of meaning. A semantic network, such as is set out in Figure 4.3, provides the best means of distinguishing the 'irrealis' elements in that it demonstrates each of the influencing factors of the notion of futurism.

Element 'Irrealis'	Time	CONCERNS	[Ev; Opin; Fut; Opt; Ø; Cert; Emot.chall]
		PREDICTION	[Tm; Fct; Fut; Opt; Ø; Likely; Neu]
		SPECULATION	[Tm; Fct; Fut; Opt; Ø; Pos; Neu]
	Event	ANXIETY	[Ev; Opin; Fut; Opt; Ø; Cert; Emot. chall]
		PROPHECY	[Tm; Opin; Fut; Opt; Ø; Cert; Emot.chall]
	Action	THREAT	[Ev; Opin; Fut; Opt; Ø; Cert; Emot. chall]
		SUGGESTION	[Act; Opin; Fut; Opt; Col; Pos; Neu]
		CALL FOR COLLABORATION	[Act; Opin; Fut; Opt; Col; Cert; Emot. chall]
	Fact	RECOMMENDATION	[Act; Opin; Fut; Opt; Spec; Cert; Emot. chall]
	Opinion		
	Past		
Present			
Future			
Optionality			
Obligatory			
Collective			
Specific			
Ø			
Certain			
Likely			
Possible			
Emotional challenge			
Neutral			

Figure 4.3 Semantic Choices for Characterisation of 'Irrealis' Elements and a List of 'Irrealis' Elements Displaying Their Semantic Characteristics.

The semantic network of 'irrealis' elements in Figure 4.3 brings out the usefulness of my analysis in defining the characteristics of, and differentiating between, elements. To the left of the table is set a range of the attributes used for the classification of each of the elements. The column to the right lists the attributes of each elements as

selected from the range of potential semantic characteristics. Many of the elements differ as to their profile. Those with similar meaning can be differentiated from others by the presence of at least one attribute in the construction of their definitions. The different attributes which characterise each element substantiate the utility of my definitions in the overall analysis.


The semantic network reveals how the nine 'irrealis' elements are distinguished from each other. Expressions of the 'irrealis' components are also found in other elements which do not have futurism reflected in the definitions of the elements or the labels themselves; for example, TITLE, GLIMPSE, and PROBLEM. The conclusion to be drawn here is that the crucial meaning of the texts on climate change, population growth, and deforestation centres around the debate on different aspects of our future. The following section discusses how this debate is presented.

4.13 NEGATIVE VIEW OF THE FUTURE AS CRUCIAL MEANING

It has been found from the GSP analysis that the dominant meaning in the three sets of texts concerns futurism. It is obvious in several elements because of the sense of future reflected in the definitions of the elements or their labels, as illustrated in the semantic network of the 'irrealis' (Figure 4.3). However, there are other elements that do not suggest futurism in their definitions even though the meaning expressed in the element concerns the future. Table 4.14 reveals that a sense of the future is expressed in all elements except TECHNICAL LEAD-IN, and SUMMARY.

	GSP ELEMENT	CLIMATE CHANGE	POPULATION GROWTH	DEFORESTATION
TUNING	TITLE	1	0	0
	GLIMPSE	8	3	3
	SETTING	0	1	3
	PROPHECY	2	2	1
	THREAT	7	2	1
	PROBLEM	0	5	2
	TECHNICAL LEAD-IN	0	0	
FOCUSSING	SPECIFIC CLAIM	1	0	1
	GENERAL CLAIM	1	0	0
	BRIDGING	3	1	5
	EVALUATION	5	0	2
	CURRENT PROJECT	2	1	1
	PREDICTION	7	10	6
	CONCERNS	3	3	3
	SOLUTION	2	1	3
	SUGGESTION		4	4
CLOSING	SUMMARY	0		
	CONCLUSION	1	0	2
	ANXIETY	5	0	2
	SPECULATION	4		
	CALL FOR COLLABORATION	1	3	0
	RECOMMENDATION	1	6	4

Table 4. 14 ‘Irrealis’ Components Expressed in GSP Elements in the Three Sets of Texts.

 Elements not found.

N.B This table was derived from Tables 1-3 Appendix 7.

At this point we need to ask “Can we describe the future in certain terms?” “What kind of future is constructed by each of the three sets of texts?” The analysis reveals that some of the definitions of the GSP elements are inherently affectual, for example THREAT and PROPHECY. Other elements are not inherently affectual by definition, but they may have extra components which constitute affectual aspects. The following section deals with affectual meaning expressed in the two sets of texts. Affectual meaning concerns the writer’s viewpoints and attitudes; thus, to deal with affectual meaning is to deal with the interpersonal perspective. To investigate the means by which affectual meaning is conveyed in the three sets of popular text, it is useful to apply the notion of ‘appraisal’ employed by Martin (1992, 1995, and 1996).

According to Martin (1996), ‘affect’ is one component of appraisal and can be realised in three ways.

1. ‘Affect’ as ‘quality’.

Quality can be expressed,

- * as Ephitet to describe participants, for example, a **happy** boy;
- * as Attribute, for example, the boy was **happy**; and
- * as Circumstance, such as the boy played **happily**.

2. ‘Affect’ as ‘process’.

Two process types that realise affect are ‘affective mental’ and ‘affective behavioural’.

An example of affective mental process is “The present **pleased** the boy”. And an example showing affective behavioural process is “The boy **smiled**”.

3. Affect as ‘comment’, for example, “**Happily**, he had a long nap”.

Within the three means of realisation, affect can be looked at from two perspectives; positive and negative. Positive affects produce good feelings and negative affects produce bad ones. Affect can also be graded according to its having high, median, and low value of being positive or negative. The notion of affect is schematised in Diagram 4.1.

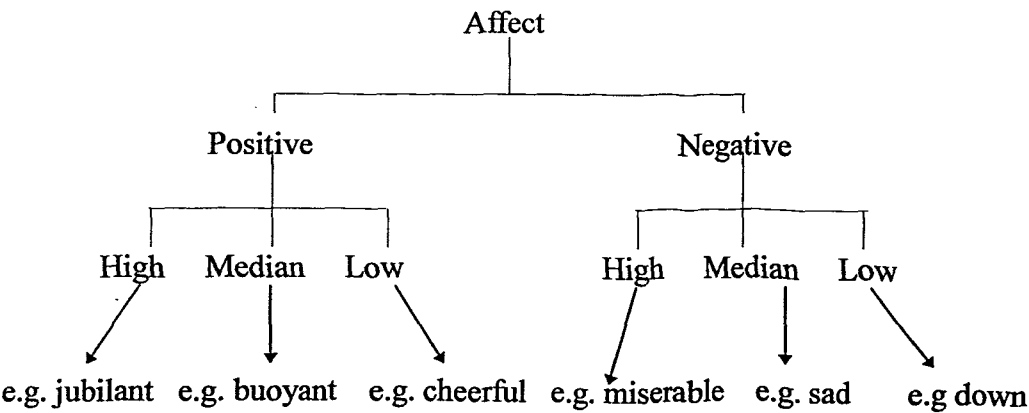



Diagram 4: 1 Taxonomy of Affectual Meaning

Following the above definitions, each element of all three sets of texts was examined to ascertain the relative frequency with which positive and negative affectual meaning is expressed.

	GSP ELEMENT	CLIMATE CHANGE		POPULATION GROWTH		DEFORESTATION	
		Positive	Negative	Positive	Negative	Positive	Negative
TUNING	TITLE	2	5	1	1	0	2
	GLIMPSE	1	6	1	5	0	4
	SETTING	0	1	0	0	0	4
	PROPHECY	0	1	0	1	0	1
	THREAT	0	1	0	2	0	1
	PROBLEM	0	6	0	5	0	7
	TECHNICAL LEAD-IN	0	0	0	1		
FOCUSSING	SPECIFIC CLAIM	1	4	1	3	1	3
	GENERAL CLAIM	0	0	0	0	0	0
	BRIDGING	1	5	2	8	4	7
	EVALUATION	0	2	3	5	1	4
	ONGOING PROJECT	0	0	0	0	0	1
	PREDICTION	0	4	0	6	1	2
	CONCERNS	0	4	0	3	0	3
	SOLUTION	1	0			0	3
CLOSING	SUGGESTION			0	2	0	1
	SUMMARY	0	0				
	CONCLUSION	0	1	1	2	0	1
	ANXIETY	0	5	0	1	0	2
	SPECULATION	1	0				
	CALL FOR COLLABORATION	0	0	0	2	0	0
	RECOMMENDATION	0	1	0	4	1	0

Table 4.15 Comparison of Affectual Meaning Expressed in the GSP Elements in the Texts on Climate Change, Population Growth, and Deforestation.

 Elements not found.

N.B This table is derived from Tables 4-6 Appendix 7.

The comparison of positive and negative affectual meaning expressed in the three sets of texts, as set out in Table 4.15, reveals that the affectual meaning appearing in the texts is associated predominantly with negative judgment and is usually clustered around such elements as THREAT, PROPHECY, CONCERNS, PREDICTION. In addition, negative affectual meaning is found, on occasions, heavily concentrated (such as in BRIDGING and PROBLEM), in elements that do not suggest negative aspects in their labels. That is, in TUNING, negative affectual meaning is found in TITLE, GLIMPSE, and PROBLEM; and in FOCUSSING, it is found in BRIDGING

and EVALUATION. The first observation to be made at this stage is that the texts on climate change, population growth, and deforestation tend to focus on negative aspects of environmental issues. All through the three global stages, the negative affectual meaning is continuously developed. Examples of lexis and expressions with negative affectual meaning found in the three sets of texts are *environmental damage, global warming could, after all, wreak havoc in the tropics, putting 350 billion people at risk of famine, destruction, ecological disasters, hundreds of millions of people are going to starve to death, malnutrition, malnourish, population growth and overpopulation among the rich are creating a lethal situation for the entire world, etc.*

This finding is consistent with that of Corner and Richardson (1993: 223) who pointed out that “mediations of the environment are often characterised by a strong element of threat and risk, ranging from ill health to planetary death”. When we compare the elements in TUNING and CLOSING, it is found that the number of elements containing negative affectual meaning in TUNING is much higher than that in CLOSING. This can be explained by the fact that the nature of TUNING is its obvious design to catch the reader’s attention in order that they continue reading until the end of an article. An effective means of doing so is to entice them with some information or a scenario that involves them emotionally.

	GSP ELEMENT	CLIMATE CHANGE		POPULATION GROWTH		DEFORESTATION	
		Negative	Negative 'Irrealis'	Negative	Negative 'Irrealis'	Negative	Negative 'Irrealis'
TUNING	TITLE	5	0	1	0	2	0
	GLIMPSE	6	3	5	2	4	1
	SETTING	1	1	0	0	4	2
	PROPHECY	1	1	1	1	1	1
	THREAT	1	1	2	2	1	1
	PROBLEM	6	4	5	3	7	2
	TECHNICAL LEAD-IN	0	0	1	0		
FOCUSSING	SPECIFIC CLAIM	4	1	3	1	3	1
	GENERAL CLAIM	0	0	0	0	0	0
	BRIDGING	5	1	8	0	7	5
	EVALUATION	2	2	5	0	4	2
	CURRENT PROJECT	0	0	0	0	1	1
	PREDICTION	4	4	6	6	2	2
	CONCERNS	4	2	3	2	3	3
	SOLUTION	0	0			3	2
	SUGGESTION			0	0	0	0
CLOSING	SUMMARY	0	0				
	CONCLUSION	1	1	2	1	1	0
	ANXIETY	5	5	1	1	2	2
	SPECULATION	0	0				
	CALL FOR COLLABORATION	0	0	2	2	0	0
	RECOMMENDATION	1	1	4	1	0	0

Table 4.16 Comparison of Incidence of Negative Affectual Meaning and Negative 'Irrealis' Expressed in the GSP Elements across Climate Change, Population Growth, and Deforestation Texts.

 Elements not found.

N.B This table is derived from Tables 7-9 Appendix 7.

Table 4.16 is a result of the mapping of Table 4.14 onto Table 4.15, and suggests that a main focus of the negative affectual meaning revolves around perceived aspects of the future. These perceived aspects of the future are expressed in most elements throughout the texts, but particularly, of course, in the elements in which the future is discussed. Two issues of concern arising from the results of the analysis are that there are comparatively few negative predictive elements in total throughout the texts (in some cases the element is made up of one to two clauses) and that the elements with predictive components are very widely dispersed. Despite being dispersed rather than

concentrated, all predictive elements play an important role in the text. These elements carry many responsibilities for the impact of the article as popular readers are inclined to understand and accept the implications or evaluative information the writers offer rather than ingest the purely technical information (Bell 1994: 35). The highest frequency of occurrence of these elements is in TUNING and CLOSING. Ideationally, all of them are concerned with what the future holds in terms of the consequences of climate change, population growth and deforestation. Interpersonally, these elements are meant to alarm the readers and thus invoke some action. This is also the case with other environmental issues presented in mass media (Cracknell 1993: 3-21). In terms of the overall texts, the alarming message that appears in TUNING is designed to give the reader an idea about the following parts of the text, while that in CLOSING follows up points made earlier.

'Irrealis' elements such as THREAT, PROPHECY, PREDICTION, CONCERNS, and SPECULATION are not found as extensively as other informative elements such as BRIDGING and SPECIFIC CLAIM. BRIDGING is the element in which the writer provides the readers with scientific background as a basis for understanding the whole argument. The type of information in BRIDGING, however, varies from article to article. Some articles provide depth and context, and frame information in such a way as to lead readers to critical judgments. Some merely provide information. In fact, we would expect to find more of the former (Friedman 1993: 27). BRIDGING provides popular readers the capacity to make predictions or suggest that 'something' needs to be done. SPECIFIC CLAIM contains technical information in support of the writer's viewpoint. Research findings cited from experts give credit to popular science articles. In other words, both BRIDGING and SPECIFIC CLAIM serve to establish the credentials of the writers to enable them to successfully and convincingly invoke action at the end of the article.

Given the above, the fact that the 'irrealis' elements tend to be broadly dispersed is not unexpected. Writers insert predictive components in many parts of the texts

without regard to GSP elements. It indicates that the notion of a future of “doom and gloom” is crucial for writers of popular science articles used in the present study. The ‘crucial meaning’ must be conveyed constantly so that the readers are instilled with the ‘illocutionary force’ of all of the predictive propositions. By contrast, the “doom and gloom” scenario is very unlikely to be the focus of popular science in other subject areas. An obvious example is from medical science; reports on scientific advances in medicine are usually presented positively by saying what is discovered and what implications this bears.

Having found ‘futurism’ to be a main semantic characteristic of the three sets of texts, it remains to ascertain how the notion of the future is constructed.

4.14 THE CONSTRUCTION OF FUTURISM IN AN ENVIRONMENTAL CONTEXT

In the previous section it was shown that the crucial meaning in the three sets of texts revolves around the notions of projection, prediction, and futurism, or the ‘irrealis’. Projection, prediction, and futurism are terms that cannot be used interchangeably. Projection and prediction have slightly different meanings but all deal with futurism or ‘irrealis’. Because they share the characteristic of ‘futureness’, they are considered in this thesis as characteristics of futurism. As far as the analysis is concerned, futurism has been found to be a very salient feature in environmental issues because it has a degree of affective power by which readers are influenced. It has such power because it deals with a future that is presented as one of “doom”, that is, judgment (in Old English). To be able to talk about the future in such a constantly negative sense, the writers are forced to refer to, or cite authorities to support their claim, proposition, or viewpoint. When writers quote an authority, it means they are appropriating the meaning from a source (and perhaps) from a secondary source. The writers (either as quoters or as reporters) in some sense are receiving or accepting wording or meaning

from the authority they cite. In other words, futurism, expressed in the three sets of texts, is based on an authority's 'point of view'.

The notion of 'point of view', elaborated by Butt (1989: 75-94), can itself be regarded as a strategy we use to construct or describe the world or reality around us. The reality, however, constructed through 'point of view' can be thought of as an 'artefact' because it deals with the future in a heuristic sense⁴ (ibid). It is an attempt to make the abstract more concrete by making it a cultural object or abstract tool. According to Butt (ibid) and Halliday (1994), 'point of view' can be realised lexicogrammatically by:

1. modality: may, might, could, would ...
2. modal adjuncts: possibly, probably, often ...
3. clause-like structures: I think, it's possible that ...

There are other lexicogrammatical forms related to 'point of view' but these are not quite so obvious in their semantic relevance. They are;

1. the expression of conditions-- 'if' clauses ...;
2. the various means by which one reports on the sayings and meanings of other people; and,
3. the ways by which one expresses the reactions and perceptions of different individuals, including oneself (Butt 1989: 75-94).

The main concern of this section is how the notion of 'point of view' can give insights into the finer semantic characterisation of the studied texts. The lexicogrammatical realisations of 'point of view' cited above can be categorised according to their 'implicitness' or 'explicitness'. The notion of being implicit and explicit is essential because it relates to the characterisation of an issue being contentious or not. As pointed out earlier in 4.12, the semantic elements dealing with the future which have been found in the three sets of texts indicate three different qualities in the issues

⁴ Heuristics has an 'as if' character.

(Figure 4.2), and this observation is further pursued by looking at how different kinds of future are expressed in the three sets of texts. The first step is to review some theoretical issues related to the notion of ‘implicitness’ and ‘explicitness’, which will be followed by a discussion of how these two notions reflect the different characteristics of futurism as expressed in the three sets of texts.

4.14.1 Contestable ‘point of view’

Projection is a phenomenon in which the source of a statement (who said what?) can be retrieved. Halliday (1994:219-273) proposed two types of clause under the topic of projection: projecting and projected clauses. Projected clauses are projected through projecting clauses as ‘locution’ (a construction of wording), or as an ‘idea’ (a construction of meaning). There are three main types of projection: quotes, reports, and ‘facts’. In quoting and reporting, there is normally a participant who does the projecting in the projecting clause. The participant can be either a Sayer (in verbal processes) or Senser (in mental processes) acting as the subject of clause complexes. For ‘facts’, there are no human participants. They are ‘objectified’ and function as constituents of other clauses. For this reason, ‘facts’ in this thesis are categorised as non-retrievable sources of information and will be discussed under non-contestable or implicit sources of ‘point of view’ (4.14.2). Only quoting and reporting are thought of as having explicit sources of information. Types of quoting and reporting are presented below.

1. **Quoting (direct speech).** The projecting clause contains either verbal processes (saying) or mental processes (thinking) and the projected clauses represent the actual wording or thinking. The two clauses have equal status, or a paratactic relationship.

Examples:

Locution

- Rowland *answered*, “*My research is going fine. Unfortunately, it means the world is ending!*”. (Ozone thins)

Idea

- *"It was much bigger than I thought," he recalls.* (Parasol)

2. Reporting (indirect speech). The projecting clauses contain either verbal or mental processes and the projected clauses give the meaning of what was said or thought. The relationship between the two clauses is hypotactic.

Examples:

Locution

- *Atmospheric chemists say the ozone hole will not be closed until about a century from now.* (Ozone thins)

Idea

- *Everyone **thought** that the tropics would escape the dire consequences of global warming.* (Drying)

According to Halliday (ibid), quoting and reporting are not simply formal variants; they are different from each other in a semantic sense. The projected element in quoting has independent status and is represented as wording, while that in reporting has dependent status and is represented as meaning. Accordingly, quoting is understood by readers as "being an authentic, accurate, verbatim replication of what was originally said" (Waugh 1995, Zelizer 1989). Quoting makes the texts livelier than reporting (Halliday 1994: 256, van Dijk 1988: 87, Waugh 1995: 132). On the other hand, reporting is interpreted as a paraphrase; it is the writer's or the quoter's own words, structures, claims, and assertions of someone else. There may be some changes of wording, some compression of the original message, some inferencing and evaluation (ibid). Despite such differences, quoting is similar to reporting in the sense that they are both subjective because it is the writer who decides which part of the information s/he wants to deliver to the reader, where to insert it, when, and for what particular purposes. Moreover, the fact that a speaker is presented in the projecting clause in both cases makes the source of the information explicit to the readers. Consequently, the readers can check the accuracy of the interpretation if they want to.

Quoting and reporting are projection phenomena in which human participants (Sayers or Sensors) do the projecting. There is, however, a case in which Sayers or Sensors are not human participants, but ‘things’, and they act like human participants because they can project ideas or thoughts. Even though ‘thing’ can quote and report, it deserves a category of its own because it is institution-based and therefore tends to be more powerful than a human participant’s quoting and reporting. This phenomenon is termed ‘metaphenomena’. The ‘things’ that can do the projecting and are explicit can be:

1. institutions acting on behalf of human participants such as the World Bank, the National Academy of Sciences, or the United Nations. For example; *And the World Bank estimates that it is likely to increase further--by nearly 100 million--in this decade.* (Population)
2. a combination of nouns derived from some mental processes (e.g. study, estimate, projection, trend, and forecast) and participants that can project, for example, *Estimates released last week by the United Nations Environment Program predict a 26% rise in the incident of nonmelanoma skin cancers worldwide if overall ozone levels drop 10%.* (Ozone vanishes).

Besides quoting, reporting, and metaphenomena, there is a further phenomenon that can do the projecting. According to Matthiessen (1995), ‘angle’ is a circumstantial element in the transitivity that can project, for example,

- *Even though increased CO₂ levels can fertilise crops, the net effect of increased CO₂ and increased temperature would cause a 10 per cent decline in the production of wheat, maize, soya beans and rice in developing countries, according to a study published last year in Nature by Cynthia Rosenzweig from the GISS and Martin Parry from Oxford University.* (Drying)

- To political leaders in most Third World nations, the main reason for the failure of family planning programmes to influence population growth has been the fact that they have been engrafted on an inappropriate political, social, economic, and religious context. (Pop. patterns)

Quoting, reporting, metaphenomena, and angle share a common characteristic, namely, that they contain source(s) of information to which readers can refer. They, thus, have a referential function. These phenomena not only lend credit to the texts containing them, but also “make certain texts authoritative by virtue of their association with experts, who create plausible contexts through which to convey messages” (Zelizer 1989: 371). Although these four phenomena contain explicit informants and thus have a referential function, they have different degrees of credibility and reliability. The issue of reliability is not the concern of this thesis because the truthfulness of the environmental issues does not effect the pattern of the texts. The referentiality and credibility of the texts are more relevant because they reflect the nature of the textual issues. The concern of this section is how these phenomena are manipulated in the texts when the future is being dealt with. As regards credibility, metaphenomena seem to render a higher degree of this feature because they encompass institutions, scientists or researchers, and research or a study together, instead of singling out scientists as individuals.

4.14.2 Non-contestable ‘point of view’

Modality

A statement that contains implicit or non-retrievable sources of information typically means a statement that does not have human participants in the subject position. The first category of the phenomenon relating to the construction of the future is modality. Halliday (1994:89) points out that “in a statement, the modality is an expression of the speaker’s opinion”. Modality can be distinguished according to the difference in its

‘orientation’: that is, the distinction between subjective and objective modality, and between the explicit and implicit variants.

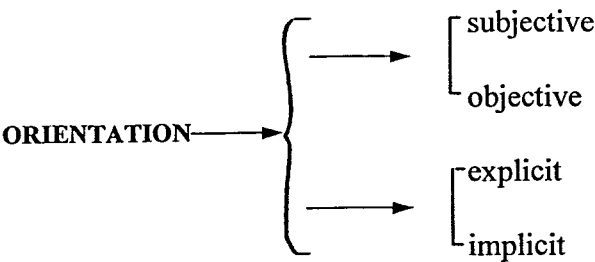


Figure 4. 4 System of Orientations in Modality (Halliday 1994:358)

Subjective and objective modality can be combined with explicit and implicit variants. The combinations yield the following:

- Subjective: explicit
- Subjective: implicit
- Objective: explicit
- Objective: implicit

It is only in subjective: explicit modality (probability and obligation) that the speaker can pose as an authority who functions as a subject in a projecting clause. They, then, are considered as clauses containing explicit sources of information (refer discussion in 4.14.1). For the remainder of the combinations (subjective: implicit, objective: explicit, and objective: implicit), the speaker or the informant is absent from the clauses. The consequence of such absence is that the texts have no referential function. The credibility and authority tend to disappear from the texts as well.

Examples:

- Subjective:** - *Ozone holes could soon open over heavily populated regions in the northern hemisphere as well as the southern.* (Ozone vanishes)
- implicit** - *By the year 2000 the world will have more than 6 billion people.* (Numbers)

- Objective:** - *By the year 2000, there are likely to be up to 130 million hungry people in the Sahel countries of Africa as a result of drought and desertification. (Hunger)*
- explicit** - *Worldwide, per capita food production rose by one-third in the period 1950-84, but it has declined by 7% in the 1984-89 period and is expected to fall by another 7 percent by the year 2000. (Hunger)*
- Objective:** - *Last year's hole was the deepest ever; this year's is expected to be as bad and possibly worse. (Ozone hole)*
- implicit** - *The population of developing countries should reach a plateau at around 9.1 billion towards the end of the next century. (Too much life)*

It is worth including impersonal projections (for example, it seems, or it is certain etc.) under modality because they show a common characteristic, viz. the absence of human participants in the subject position. An example is in the following:

- *But since tropical storms appear to form only at temperatures above 26°C, it seems likely that warmer seas will fuel more of them and that they will be more intense. (Drying)*

Conditional 'If' Clauses

The second phenomenon related to the construction of the future is hypothetical structure or conditional 'if' clauses. This type of structure is categorised as one of the indicators of implicit sources because it may have no human participants (Sayers or Sensors) acting as the subject of the clauses, for example,

- *But if the burning of the forests goes on much longer, the damage may become irreversible. (Fire)*
- *If output per person in the Third World continues to grow at the same rate as over the past 40 years, the average person in the*

Third World will be producing 1.7 tonnes of carbon dioxide each year by 2025, more than double the current level of 0.8 tonnes.
(Rich folks)

‘Fact’ as Projection

Another phenomenon is ‘fact’ which is the third type of projection proposed by Halliday. Even though it is a type of projection, it belongs to a different category in this present study as it does not identify the speaker or the informant in the clauses. Here, the projected clause is not being projected by a verbal or mental process with Sayer or Senser. Instead the projection comes in a ready package of projected form. This type of projection, projected ‘fact’, can appear only in embedded form, either as Qualifier to the noun *fact* or as a nominalisation. ‘Fact’ nouns can be sub-divided into four classes (Halliday 1994: 266-268):

1. ‘cases’ (nouns of simple fact), for example, fact, case, point ...
2. ‘chances’ (nouns of modality), for example, chance, possibility, likelihood ...
3. ‘proofs’ (nouns of indication), for example, indication, implication, evidence ...
4. ‘needs’ (nouns of modulation), for example, requirement, need, expectation ...

Examples:

- *But this reassuring picture is fading in the face of accumulating evidence that global warming could, after all, wreak havoc in the tropics.* (Drying)

- *The most popular forecast right now is that sea levels will rise two to three feet during the next century.* (Cold)

- *But the latest data imply that the ozone layer over some regions, including the northernmost parts of the U.S., Canada, Europe and Russia, could be temporarily depleted in the late winter and early spring by as much as 40%.*
(Ozone vanishes)

- *... and as world population continues to increase, the likelihood of meeting global food requirements will become ever more doubtful.* (Population)

At this point in my thesis, I will look at projection and its related forms as a resource of ‘point of view’ utilised to present futurism. To investigate how futurism within the three environmental issues is expressed, we must analyse ‘point of view’ by asking:

1. Who is the authority being invoked?
2. How does the writer transfer the responsibility of predicting onto the authority?
3. What effects does the employment of different strategies of expressing opinion have on readers?
4. Why does the writer employ those strategies?

It has been shown that the major motif of the texts under the study is futurism. Therefore, the texts will be examined only where the ‘irrealis’ meaning resides, for example, within PREDICTION, CONCERNS, and ANXIETY because these elements implicate the idea of projection and prediction. There are two related issues concerning projection, namely; 1. the projection of the future as hypothetical (what will happen?), and 2. the projection of ‘who said what’ in a futuristic sense.

The criteria used to examine the texts will enable us to determine whether predictive statements found in the semantic elements contain explicit or implicit sources of information as discussed above. In analysing the data, every single instance containing projection is counted as one instance even though there are more than one instance and one element can have more than one instance. One precaution to observe is the possibility of finding phenomena indicating implicit sources embedded in a clause containing explicit sources of information. In such cases, the informant is considered retrievable and the clause is thus counted as one instance. For example, *If we don't heed the warning this time, they write, we can look forward to "a billion or more deaths from starvation and disease," and possibly "the dissolution of society as we know it."*(Numbers).

Table 4.17 below demonstrates that there is a common pattern to the manner in which contestable and non-contestable sources of information are employed across the three sets of texts. This movement reflects how the future is constructed in each set of texts. The number of instances of the two major types of citations (contestable and non-contestable 'point of view') in the texts on climate change, population growth, and deforestation are 73, 55, and 26 respectively. This means that when writers of texts on climate change make claims concerning the future, they frequently cite authorities. The number of citations in the population growth texts drops significantly from that in the climate change texts, and dramatically from that in the deforestation texts. The pattern which emerges from the comparison of the two 'points of view' is that in the case of each of the three environmental sub-issues, there are approximately twice as many non-contestable as contestable sources of 'point of view'; 66 per cent as opposed to 34 per cent respectively in the climate change texts, 69 per cent as opposed to 31 per cent in the population growth texts, and 85 per cent as opposed to 15 per cent in the deforestation texts. In the case of deforestation texts, the small numbers of instances involved exaggerates the comparison when expressed in percentages, however these texts still conform to the overall pattern found in the other two sets of texts.

The number of citations in the climate change texts is considerably greater than the number in the population growth texts (73 and 55 respectively) and is three times the number found in the texts on deforestation (73 and 26 respectively). The number of citations in the population growth texts is more than double that in the texts on deforestation. These results support my earlier argument as to the variable visibility of processes between the three sets of texts, that is, in particular that the visible processes within deforestation issues are more concrete and more easily presented, the result being that the writers proceed as if there were less need to bulk up the authority.

This pattern illustrates the difference between the three issues as to how the future is constructed, that is, moving from a state of being more controversial to less

controversial, as shown in the three-part elliptical diagram (Figure 4.2). As argued earlier in this chapter, the nature of the issue motivates the characteristics of the texts. The findings from Table 4.17 support this argument in a convincing manner.

Text	Contestable 'point of view'						Non-contestable 'point of view'							
	Quote	Report	Angle	Meta. (Specified)	Total	%	Modality	'If'	'Fact'	Meta. (Anony mous)	Angle (Anony mous)	Report (Anony mous)	Total	%
Climate change	12	4	1	8	25/73	34	20	8	0	11	1	8	48/73	66
Population growth	4	4	1	8	17/55	31	27	5	0	2	1	3	38/55	69
Deforesta- tion	1	2	0	1	4/26	15	14	3	0	0	0	5	22/26	85

Table 4. 17 Contestable and Non-Contestable Sources in Predictive Propositions

4.15 THE CONSTRUCTION OF FUTURISM IN THE CLIMATE CHANGE TEXTS

Most notable from Table 4.17 is that the climate change texts rely on cited authorities to a much greater extent than do the texts on population growth and deforestation (73 versus 55, and 26 respectively). This supports my argument that the uncertainty surrounding climate change demands that articles on this issue reinforce their statements with experts' opinion. Scenarios for the future are therefore highly contested among different experts. Experts' judgments on this topic are presented in the form of quoting and reporting to a greater degree than in the other two topics. Consequently, writers on climate change tend to be more congruent in the way they report the information about the future. My conclusions on this aspect of the construction of futurism in climate change texts support Dunwoody's (1986:3-16) argument that journalists "tend to rely on a few well-known scientists rather than a vast network of contacts". In this way "establishment" scientists are quoted most often and this would clearly have an homogenising effect on reporting on this topic and therefore on its construction of the future.

The contentiousness of their subject also means that writers on climate change must clearly identify the source of information, for example, the status of the informant. In other words, the informant is frequently identified by his/her social function, for example,

- *Within 50 years, methane could be the prime greenhouse gas, say investigators such as Ralph Ceccerone from the US's National Center for Atmospheric Research Colorado. (Methane)*
- *Environmental Protection Agency Administrator William Reilly called NASA's latest findings "shocking and disturbing." He predicted they would result in dramatically higher skin cancer rates for humans and other as-yet-unknown damage to plants, animals, and ecological systems. (Ozone Thins)*

- *Even though increased CO₂ levels can fertilise crops, the net effect of increased CO₂ and increased temperature would cause a 10 per cent decline in the production of wheat, maize, soya beans and rice in developing countries, according to a study published last year in Nature by Cynthia Rosenzweig from the GISS and Martin Parry from Oxford University.*(Drying)

There are times when experts are presented in a projecting clause which offers judgments or predictive statements about the future without their attributes being included. This is usually because the experts have been introduced earlier in the texts. The readers still remember who, and how important they are. Therefore, propositions such as,

“More frequent occurrence of drought is a possibility,” Charlson says. “Or of violent storms. Or the opposite--less frequent storms. I’d give either chance equal billing. (‘Parasol’)

are influential because Charlson’s attributes indicating that he is a recognised expert in the scientific community, are cited constantly throughout the text. At the beginning of the article, Charlson is introduced in paragraph three as

a professor of both atmospheric sciences and chemistry at the University of Washington in Seattle, [who] has been studying aerosols since the 1960s, [who] when standard textbooks said optical scattering would never be measured accurately (among the first of Charlson’s half-dozen patents is a device that does just that) ... he has spent 30 years creating an almanac of details about what he calls “this peculiar state of material floating around in the atmosphere.

In paragraph five, his credentials are reiterated;

Last year Charlson, together with six of his fellow atmospheric researchers published the first reliable calculations of just how much heat is getting bounced away from Earth.

and in paragraph twenty they are strengthened,

Charlson won his first patent for measuring such scattering nearly 30 years

ago, with an invention dubbed the nephelometer.

and by paragraph thirty-one they are unquestioned.

Charlson is a neatly trimmed man who comes to work in a tie knotted tightly at the neck. The fuzzy carelessness of most public talk about world climate seems to offend him personally.

Alternatively, *Anderson*, who makes the prediction below, had been introduced earlier as “*Harvard chemist James Anderson*”;

But even if the hole does not appear this spring, says Anderson, it will almost certainly appear within the next few years. (Ozone vanishes)

It has been established that the highly controversial nature of the climate change issue means that when writers want to inform the readers about the future in relation to this issue, they are forced to rely heavily on experts’ voices to give readers confidence in their predictions. However, it seems that experts do not yet represent adequate authority. This may be why writers turn to voices of higher authority. Such higher order of authority relied on is, typically, a scientific institution. By quoting pronouncement made by such institutions, the credibility of the text is elevated because the institutions, as opposed to individual scientists, are assumed to act in an unbiased manner in that they encompass scientists and research together. As a consequence, the more controversial the issue, the higher the intensity of authoritative voices. Examples of using institutions to support the writer’s viewpoint are:

- *The National Academy of Sciences estimates that a 1 % drop in ozone levels could cause 10,000 more cases of skin cancer a year in the U.S alone, a 2% increase. (‘Heat’)*

- *The full effects on the global climate will come later, and even if the amount of CO₂ in the atmosphere stabilises at double today’s levels the International Panel on Climatic Change (IPCC) estimates that by end of the 21st century the global temperature will have increased by between 1.5°C and 4.5°C. And if no*

replacements for fossil fuel are found, the temperatures could continue to escalate.
(‘Drying’)

- But the latest data [from NASA] imply that the ozone layer over some regions, including the northernmost parts of the U.S., Canada, Europe and Russia, could be temporarily depleted in the late winter and early spring by as much as 40%. That would be almost as bad as the 50% ozone loss recorded over Antarctica. If a huge northern ozone hole does not in fact open up in 1992, it could easily do so a year or two later. (Ozone vanishes)

4.16 THE CONSTRUCTION OF FUTURISM IN THE POPULATION GROWTH TEXTS

The divergence in the number of explicit citations (contestable ‘point of view’) shown in Table 4.17 implies that futurism is expressed differently in the population growth texts to the way it is expressed in the climate change texts. There are more implicit statements about the future in the population growth texts and so it would appear that the writers in these texts are comfortable with making predictive propositions without stating the sources of the information. The most frequent form of implicit opinion in population growth texts is modality.

Examples:

- By the year 2000, there are likely to be up to 130 million hungry people in the Sahel countries of Africa as a result of drought and desertification. (Hunger)*
- Whatever happens before the year 2000, China will presumably by then have passed the one billion mark. This means that the population will have doubled since the 1949 revolution, following 150 years in which the population is reputed to have increased by any 50 per cent. (China’s people)*
- Population growth rates throughout most of the Third World remain extraordinarily high. For example, in the geographical area known as South Asia and comprising India, Pakistan, Bangladesh, and Sri Lanka, there is a total population of some 1300 million. This is increasing by over 40,000 every*

day; the growth rate as a whole is 2.4 per cent per annum, indicating that numbers could double in less than 30 years. (Pop.patterns)

An assumption seems able to be made here with little likelihood of the ‘point of view’ being contested. The writer assumes that he or s/he can rely on her/his own authority.

4.17 THE CONSTRUCTION OF FUTURISM IN THE DEFORESTATION TEXTS

The deforestation texts represent an extreme case of how the future is constructed. Among the three sets of texts, the deforestation texts manifest the lowest number of citations. The number of explicit and therefore contestable sources referring to the future was found to be very low. The fact that the deforestation texts manifest fewer ‘irrealis’ elements does not suggest that there is a low degree of futurism. As shown in Table 4.17, when the future is referred to in the deforestation texts, the reference is expressed implicitly in the large majority of cases. (85 per cent of all ‘points of view’ expressed were non-contestable). The most frequently used non-contestable ‘point of view’ is modality. Notice that this has strong tense orientation, that is, *will*. When modalities (*may be*) are used, a verb with strong affect (*doomed*) is used.

Examples are;

- *But if the government is as ineffective in enforcing its new laws as it is the old, Thailand’s rainforests will continue to fall and the rains will continue to wash away its soil.*(Jungle law)
- *Despite heroic efforts, Madagascar’s splendid animals and wondrous forests may be doomed.* (Eco-disaster)
- *The skies over western Brazil will soon be dark both day and night. Dark from the smoke of thousands of fires, as farmers and cattle ranchers engage in their annual rite of destruction: ...* (Fire)
- *At current rates of logging, all unprotected ancient forest in western Washington and Oregon will be gone by the year 2023. The last stands in the*

Olympic, Gifford Pinchot, and Siskiyou National Forests will be gone by 2089 and could be irreparably fragmented by the early 1990s. ... (Ancient forests)

- If the rain forest disappears, the process will begin at its edge, in places such as Acre and Rondônia. While the Amazon forest as a whole generates roughly half of its own moisture, the percentage is much higher in these western states, far from the Atlantic. This means that deforestation is likely to have a more dramatic impact on the climate in the west than it would in the east. "Imagine the effects of a dry season extended by two months," says Fearnside. The process of deforestation could become self-perpetuating as heat, drying and wind cause the trees to die on their own. (Fire)

Furthermore, the deforestation texts do not rely heavily on the notion of 'irrealis' to construct the future. On the contrary, they rely more on the notion of 'realis', that is, what has already happened. This suggests an assumption by the writers that the deforestation issue has already been shaped in the public's mind; people accept it and do not question its nature. They can use what has happened in the past to confirm what will happen in the future.

Thus far, what has been discussed is the notion of how futurism is constructed in the three sets of texts. A certain semantic pattern is observable moving from the texts on climate change to population growth and deforestation, which manifests in the different strategies employed in the texts when the future is dealt with. The climate change texts rely heavily on explicit citations while the deforestation texts rarely cite explicitly. The number of explicit citations in the population growth texts falls between those of the texts on climate change and deforestation, with a tendency towards greater implicitness. It can be seen that the semantic drift is motivated or determined by the different qualities of the three issues, ranging from the most to the least contentious. The idea that a certain set of claims is contentious or that debate still surrounds it, is reflected in the utilisation of explicit citations. Since, among the three issues, the climate change issue is by far the most contentious, the scenarios

surrounding it are contested by such people as researchers and politicians. Consequently, the writers tend to be more congruent about the way they report the information. In particular, they need to stress the authorities and information sources (who said what?) that do exist. This can all be rearticulated as a factor of the variable *tenor*: namely, the predictions about the people interacting through the article. The subtle shift in the writer's predictions about the audience leads to a distinct graduation in the semantics of judgement/point of view. We can start at any one of the three strata and state the argument.

Chapter Five

Interaction between Verbal and Visual Representations

5.1 INTRODUCTION

Chapter four compared and discussed the findings of the analysis of the texts on climate change, population growth, and deforestation. The final section of the analysis in Chapter four dealt with the particular focus of the texts on futurism and how it is constructed. This chapter focuses on the relationship between verbal and visual representations in the articles under analysis. Its aims are twofold; firstly, to characterise the relationship between verbal and visual forms of representation in all of the sample texts, and secondly, having characterised that relationship, to evaluate its consistency, or otherwise, with the findings in chapter four which argued that the crucial meaning exhibited in the sample texts is a negative evaluation of the future.

5.2 VERBALS AND VISUALS

Receiving information constitutes a learning process. We assume that we learn, understand, see, and perceive things better if we get the information through at least two, or even multiple means (Bateson 1979: 67-88; Butt 1989: 72; Goodman 1979; Vygotsky 1962). The process of giving information should be thought of in terms of the pluralism of the reality, viz. that there are different ways of world making depending on the point of view the writer adopts, the kind of meaning the writer mobilises, or the forms of representation the writer chooses. Information given in different ways creates different pictures of the world. The clearest boundary of different forms of presentation is between verbal presentation and non-verbal presentation. Both are important. If a point of view, a reality, information, or data are presented in at least two ways, we have extra dimensions, or 'depth', added to our understanding. The 'depth' is achieved by the same information being presented in a

slightly different form (Bateson 1979:67-88). In other words, two versions of the same thing do not necessarily produce redundancy (Goodman 1979:3).

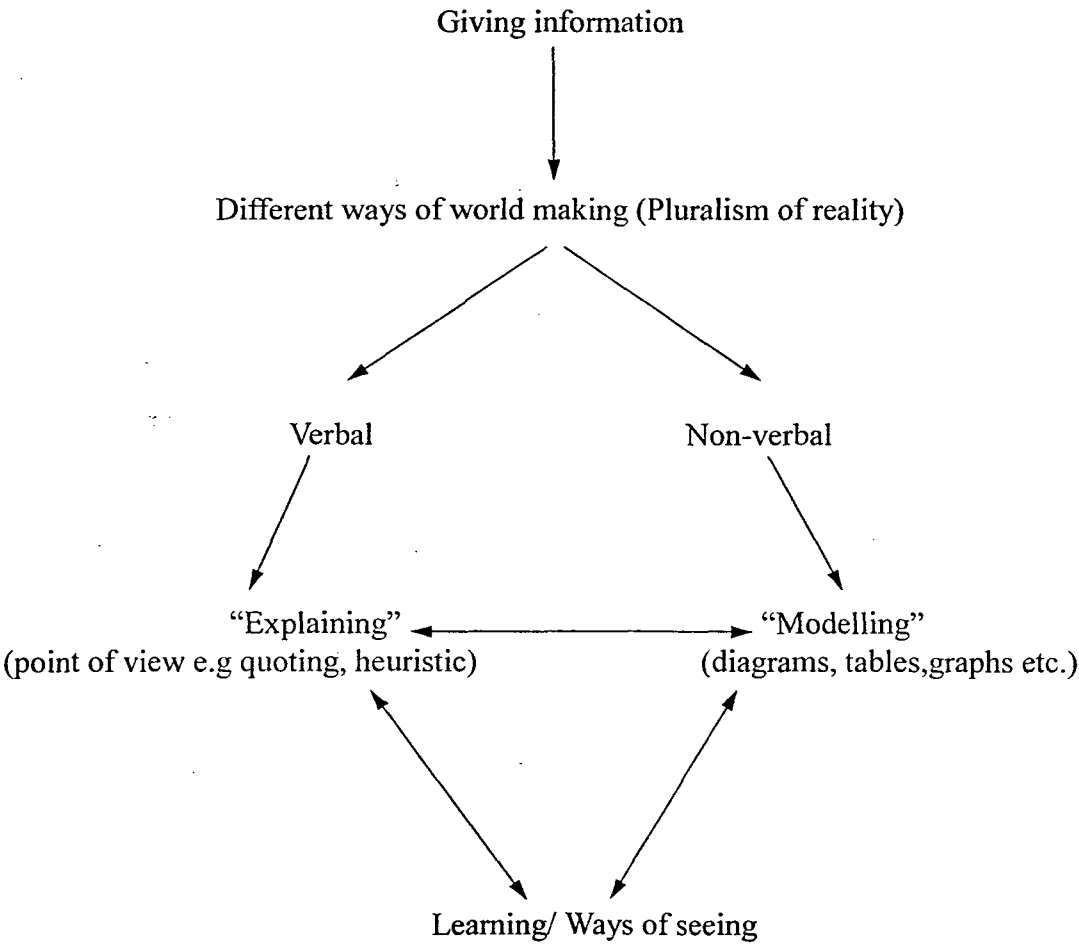


Figure 5. 1 Different Ways of World Making.

In the realm of semiotics, visuals, images or non-linguistic signs are one way of meaning making as opposed to the linguistic mode. They are culture specific though, in ways which are not co-terminous with language boundaries. They are conventionally used and understood within a certain social context because it is through the social system that the meaning is constructed (Halliday 1985:4; Kress & Van Leeuwen (1990:23). Kress & Van Leeuwen (ibid) state:

In a thoroughgoing social approach to semiotics--whether visual or linguistic--the structures of social relations are in fact always prior. That is, the way in which producer of image and viewer of images are placed socially, affects--perhaps determines--both what the image is about, and its reading and uses. In other words, what gets represented, how what gets represented is represented, as well as how that is read and used, are all effects of the social place of producers and viewers of images (or of writers and readers of verbal text). Viewing an image entails first and foremost, and before anything else has happened, being located in a particular social way by and in relation to the image.

Signs and their connotations always render a multiple message and shape readers' or viewers' ways of thinking about the world (Bignell 1997:16). For example, according to the Collins Cobuild English Language Dictionary, the word "environment" means "the natural world of land, sea, air, plants, and animals that exists around towns and cities". But this word, after being mediated by and through a social practice, that is, mass media, also connotes the notion of "risk" (Bignell 1997:126). By the same token, a photograph of car exhausts or smoking factory chimneys can be perceived as they are. But after environmental issues have gained more and more public attention, a photograph of car exhausts or smoking factory chimneys becomes an icon used by the mass media to represent the notion of global warming. This reflects the constant media message that the main cause of global warming is the greenhouse effect, which is caused by emissions of carbon dioxide from the burning of fossil fuels by vehicles and industry.

Even though meanings can be expressed both verbally and visually, each medium has its own possibilities for, and limitations to expressing meanings. Not everything that can be realised in language can also be realised by means of images, or vice versa. But even if something can be expressed both verbally and visually, as one moves further in delicacy of interpretation, the two modes produce meanings that are different (Kress & Van Leeuwen 1996:2,18). The two forms of representation are thus thought of as forming an interrelationship; they help in building up a better understanding of what is being represented because the same message is given twice in a different form (Butt: in press).

Kress & Van Leeuwen (1990, 1996) have developed a Systemic Functional Approach to analyse visuals in various forms, for example, photographs, graphs, and diagrams. Their method of visual analysis is useful for analysing individual visuals whether they are predominantly experiential, interpersonal, and/or textual in their organisation. But

they have not incorporated function to a satisfactory degree as yet; for example, they have not included metafunctions in the way that O'Toole's work on displayed art has developed the theory. On the other hand, O'Toole's theory committed me to an approach at different ranks which would have demanded a scale that was out of keeping with the congruence of meaning (between visual and verbal) which I was seeking to clarify. Butt's semantic axes (1994, 1996) addressed the problem economically.

Having noted that the verbal and visual modes are interrelated, we can expect that visuals accompanying written texts would, to a certain extent, express similar ideas to those in the written texts. As it has been found in earlier chapters that the crucial meaning exhibited in the three sets of texts is one conveying a negative judgment of the future, it is very likely that visuals accompanying the texts would exhibit a congruent meaning. This aspect of the relationship between visuals and texts will be discussed in 5.3.

5.3 INTERACTION BETWEEN VERBAL AND VISUAL MODES

To gain an insight into how the visuals utilised in the texts under study interact with the written texts, the visuals are first organised according to the categories given below. Then examples of the visuals will be discussed in conjunction with their captions and corresponding verbal explanations in the texts.

Types of visuals

- * **Diagrammatic:** Visuals presented in a diagrammatic form such as histograms, pie charts, linear graphs etc.
- * **Schematic:** Visuals presented in diagrammatically pictorial forms.
- * **Stylised:** Naturalised visuals that are further modified.
- * **Naturalised:** Photographs representing real objects or human beings.

Quality of information expressed in visuals

- * **High order of information:** Informative visuals that can engage the readers. The readers are meant to be empowered by the information provided; they can interpret or draw inferences from the information, working beyond what is given in visuals. In other words, visuals serve to extend the argument in the texts.

- * Restated information: Visuals that illustrate a certain point made in written texts, acting as a memory device. No new information is provided.
- * Low order of information: Visuals that have some relevance to written texts with the purpose of decorating the text. They do not have the role of extending the argument in the text.

5.3.1 Types of Visuals Employed in the Texts on Climate Change, Population Growth, and Deforestation

Visual accompanying the climate change texts

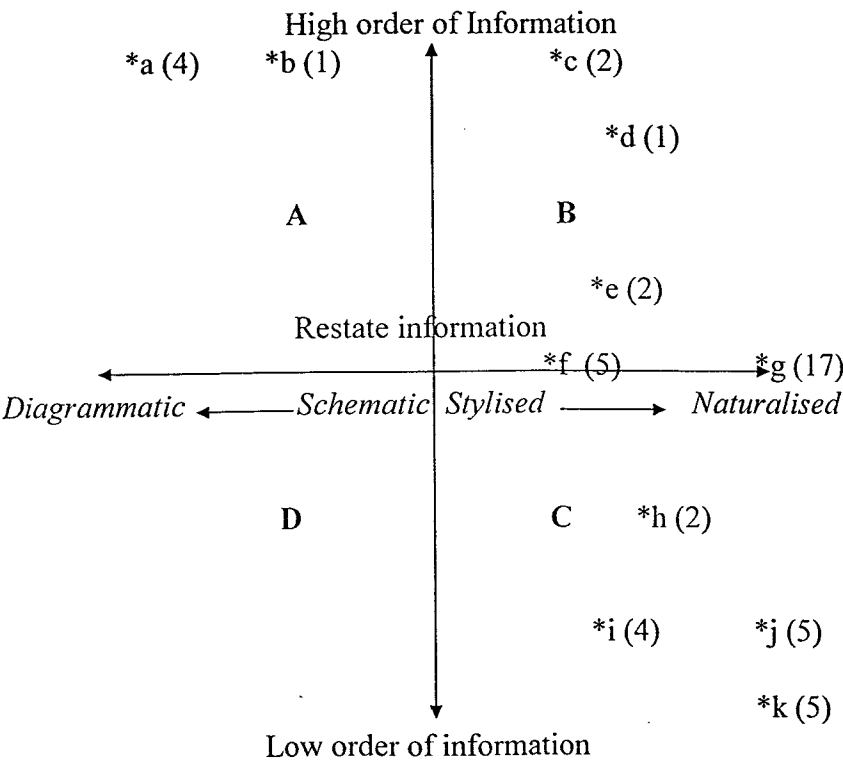


Figure 5. 2 Categories of Visuals Accompanying the Climate Change Texts.

N.B. The horizontal axis is the Diagrammatic/Naturalised axis where the schematic and stylised modes are at the origin. Visuals which reside further from the origin to the left take a more diagrammatic form. Visuals residing further from the origin to the right take a more naturalised form. The vertical axis is the ‘High/Low order of information’ axis with ‘Restate information’ at the origin (‘o’). The further that visuals reside from the origin towards the ‘High order of information’ end the more informative they are, extending the argument and thus bringing the readers beyond the information given in the wording. Visuals residing along this line are considered

as having higher ideational value than those below the horizontal axis. The further they lie from the origin down to the 'Low order of information' end means visuals are less informative and have less ideational value. Whether informative visuals have high or low textual value depends on how much verbal information is restated in visuals. Numbers in the brackets refer to the numbers of visuals.

The qualities of visuals located in Figure 5.1

Quadrant A visuals = informative visuals in a diagrammatic form.

Quadrant B visuals = informative visuals in a naturalised form.

Quadrant C visuals = less informative visuals in a naturalised form.

Quadrant D visuals = less informative visuals in a diagrammatic form.

Within each group below is noted a visual identification code and label which are referable to the articles reproduced in Appendix 1.

Group a: CC12 (snow levels), CCA4 (climate record) CCM3 (greenhouse gas chart), CCOT4 (chlorine levels)

Group b: CC16 (ice age)

Group c: CCD5 (climate model), CCOT6 (ozone decline)

Group d: CCH1 (ozone depletion)

Group e: CCH2 (molecules), CCH3 (satellite image 1)

Group f: CCS1 (satellite image 2), CCA3 (cloud formation model), CCA4 (phytoplankton map), CCOV2 (ozone map), CCOV4 (ozone danger)

Group g: CCC1 (ice sheet), CCH1 (icecap 1) CCB3 (icecap 2), CCH4 (drilling ship), CCA1 (ocean algae), CCA2 (algal cloud), CCM4 (Arctic bogs), CCM5 (rubbish tip), CCH4 (factory), CCH5 (termite mound), CCH6 (refrigerator), CCH7 (Amazon deforestation), CCH8 (rubbish), CCH9 (paddies), CCH10 (U.S mid-west), CCOV3 (skin protection), CCOT5 (Rowland)

Group h: CCP3 (satellite image 3), CCP4 (CFC map)

Group i: CCD1 (coconut and ice), CCD2 (coconut-shell), CCD3 (starfruit), CCD4 (capsicum)

Group j: CCM1 (cows), CCM2 (cow dung), CC15 (ice cavern), CCOV1 (globe), CCOT1 (cloudy sky)

Group k: CCP1 (Charlson 1), CCP2 (Charlson 2), CCOT2 (Anderson), CCOT3 (Solomon),

Figure 5.2 shows that for the climate change texts, quadrant B contains the highest number of visuals (27), quadrant C contains the second highest number of visuals (16), and quadrant A contains the lowest number of visuals (5). No visuals were found in quadrant D. However, this is not unexpected given that any visuals in diagrammatic form usually provide some information.

Visuals accompanying the population growth texts

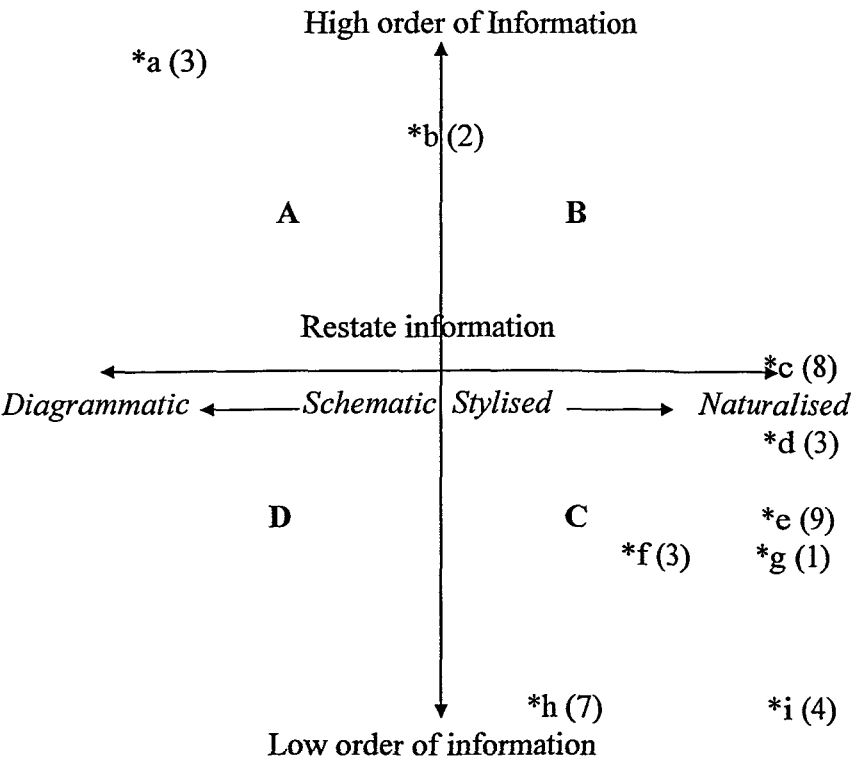


Figure 5. 3 Categories of Visuals Accompanying the Population Growth Texts.

- Group a: PGCP1 (China statistics), PGMP3 (crowded house), PGTML3 (CO₂ emission)
- Group b: PGN2 (1989 population), PGN3 (energy consumption)
- Group c: PGRF1 (auto dump), PGRF3 (skyscrapers), PGRF4 (children eating), PGH2 (land salinity), PGH3 (fishermen), PGH4 (crowded city 2), PGH5 (deforested land), PGH6 (African women)
- Group d: PGRF2 (polluted river), PGRF5 (copper mine), PGP2 (tree sawing)
- Group e: PGTML1 (crowded city 1), PGTML2 (polluting factory), PGP1 (crowd), PGP3

(African lunch), PGP4 (mother and child), PGTP1 (harvesting wheat), PGTP3 (bee pollinating), PGTP4 (irrigation), PGTP5 (pesticide spraying), PGPP2 (Indian poster), PGPP3 (relief clinic), PGP5 (Philippine clinic)

Group f: PGN1(multiple man 1), PGN4 (multiple man 2), PGH1 (starving boy)

Group g: PGPP1 (apartments)

Group h: PGCP2 (people's head), PGMP1 (cartoon farmer 1), PGMP2 (cartoon farmers 2), PGMP3 (multiple stylised people), PGTM1 (cartoon crowd), PGTM2 (cartoon astronaut), PGTM 3 (people and snake), PGTM4 (pregnant angel)

Group i: PGP6 (McNamara), PGTP2 (David & Marcia)

Figure 5.3 reveals that for the population growth texts the number of quadrant C visuals (27) is the highest, quadrant B contains the second highest number (8), and quadrant A contains the lowest. No visuals are found in quadrant D.

Visuals accompanying the deforestation texts

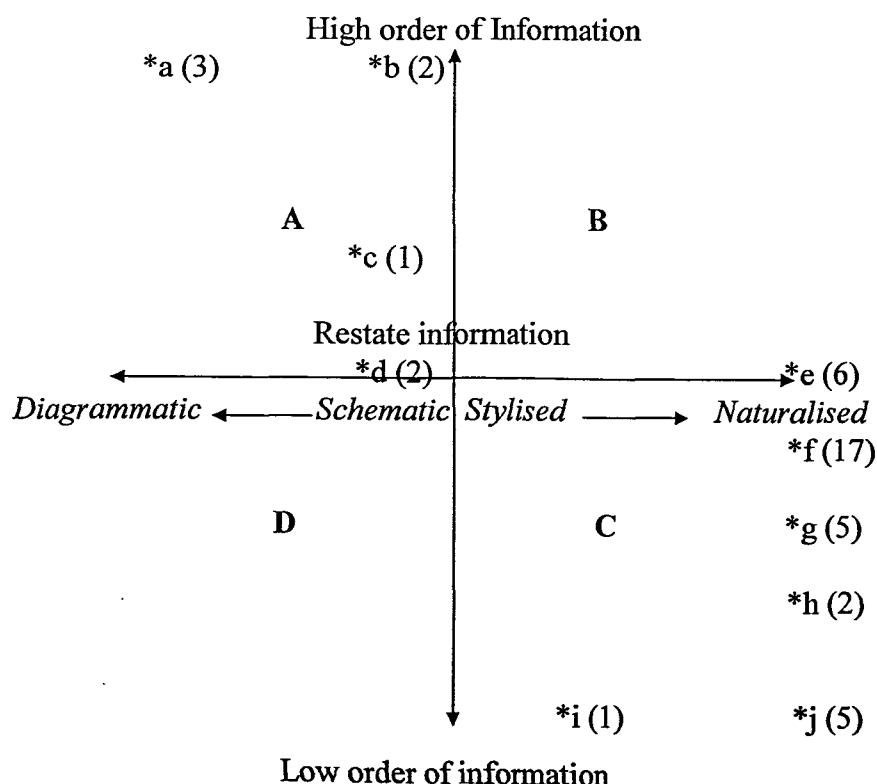


Figure 5. 4 Categories of Visuals Accompanying the Deforestation Texts.

- Group a: DTR2 (tropical forest area), DTR3 (monsoon forest area), DTR4 (SEA annual deforestation)
- Group b: DTA3 (U.S.A.'s forests), DTR5 (SEA longterm deforestation)
- Group c: DTE3 (Suriname's forest area)
- Group d: DTF7 (map of Brazil), DTP1 (map of Central America)
- Group e: DTF1 (The Amazon), DTF6 (struggling pioneers), DTF8 (Brazil's forest), DTP2 (Santa Rosa National Park), DTP3 (turtles), DTK6 (Mendes 1),
- Group f: DTK1 (floating logs), DTK5 (rubber making), DTR6 (sawn timber), DTC1 (degraded land), DTC2 (timber yard), DTC3 (transporting logs), DTC4 (treeless land), DTC5 (timber trail), DTJ1 (poppy field), DTJ2 (vegetable garden), DTEC3 (Madagascan villager), DTE1 (log stockpiling), DTE2 (logging path), (charred landscape), DTF4 (rubber tapper), DTF5 (forest burning), DTF9 (charcoal making), DTF10 (mining pollution) DTP4 (monkey), DTA2 (spotted owl)
- Group g: DTK4 (forest products), DTEC1 (chameleon), DTEC2 (trees), DTA1 (Great Sitka Spruce), DTR1 (forest)
- Group h: DTG1 (mountains), DTG2 (village)
- Group i: DTF2 (globe)
- Group j: DTK2 (Goldsmith), DTK3 (Conable), DTF11 (Mendes 2), DTP5 (Saavedra), DTP6 (Cardenal)

Figure 5.4 shows that for the deforestation texts the highest number of visuals falls into quadrant C, the second highest into quadrant A, and the lowest into quadrant B. No visuals are found in quadrant D.

5.3.2 Comparison of Visual Representation in the Texts on Climate Change, Population Growth, and Deforestation

Figure 5.5 shows the distribution of visuals across the three texts.

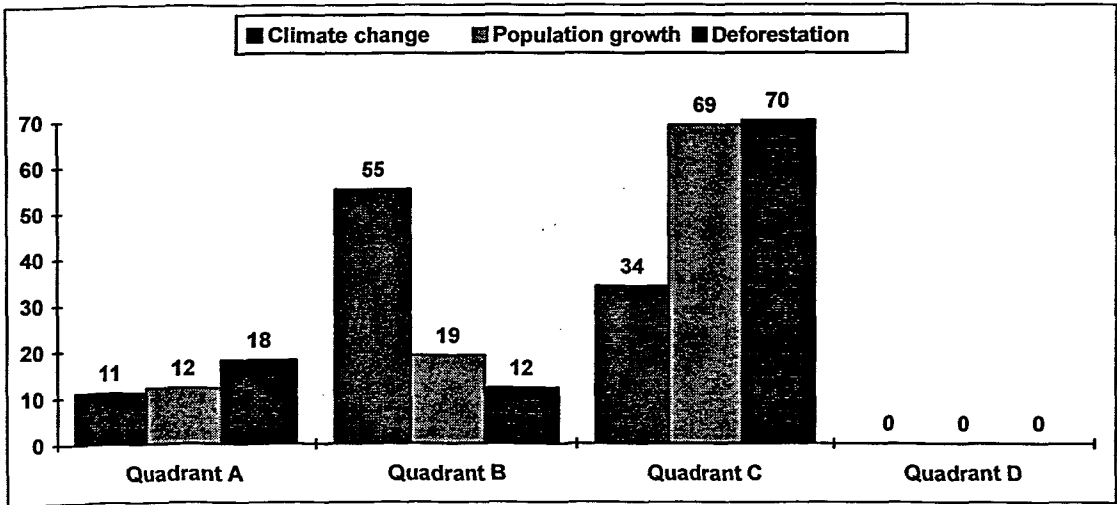


Figure 5. 5 Comparison of Different Types of Visuals across the Three Sets of Texts Expressed as Percentages.

As Figure 5.5 shows, no quadrant D type visuals were used in any of the texts. All three sets of texts utilised quadrant A visuals less than any other type. While the texts on population growth and deforestation utilised the highest percentage of quadrant C visuals, the climate change texts have the highest percentage of quadrant B visuals. There is a significant difference between the number of visuals in quadrant A and C.

This indicates a remarkably small proportion of visuals in a diagrammatic form; the majority are clustered around the ‘naturalised’ end. This suggests that only a small number of visuals carry an ideational function. A small minority of the visuals in the population growth and deforestation texts play an informative role. However a small majority of climate change text contains visuals which play an informative role. It should be noted that of the quadrant B visuals from the climate change texts, 81.5% (22 out of 27; see Figure 5.2) lie very close to the horizontal axis indicating that visuals merely restated, rather than added information. Furthermore, of that 81.5%, or

22 visuals, 17 visuals appear at the extreme right of the Diagrammatic/Naturalised axis indicating their highly naturalised form. This means that the relatively informative nature of visuals in the climate change texts, compared with those in texts on population growth and deforestation adds little, if any information, to the text and is presented in the least scientific form. The form of these naturalised visuals is commonly that of photographs of 'real objects' or people. This is consistent with my findings that BRIDGING, that element which functions to present the technical knowledge necessary for the reader, is in fact dominated by the 'Natural world entity' rather than a concentration on the 'Natural world processes' behind environmental degradation. The consistency lies in the concentration, in visuals, on entities rather than processes. This, of course, reflects the inability of the visuals to capture the future—they must rely on observable phenomena—but the fact remains that they are minimally informative, and highly naturalised in form which represents an abrogation by the genre of the scientific aspect of its role (namely, a tendency away from quantification, flow charts, comparative data, and tools of inference).

Most tellingly, quadrant A, which denotes those visuals which are the most informative, and the most scientific (diagrammatic) in their form, contains only 11%, 12% and 18% respectively of the visuals in the climate change, population growth and deforestation texts.

Visuals that have high ideational function are considered as performing the function of an 'abstract tool' that can assist the readers to have a better understanding of the written texts (Butt: in press). It is clear, however, that most of the visuals utilised in the three sets of texts put more emphasis on the interpersonal function, viz. they appear to be intended to catch the reader's attention and stimulate them to seek further information from the written texts. One would expect then, that popular science articles would be presented in a form which helps the general public have a sound grasp of technical knowledge. Table 5.5 appears to demonstrate clearly that the visuals

used in the three sets of text do not serve this purpose. This leads us to ask the following questions:

1. Are the visuals useful?
2. What functions do they perform?
3. Why are they there? Is it that the readers show that they want more visuals with higher interpersonal than ideational function? Or does it reflect editorial policy?
4. Are there any other alternatives for presenting the information?
5. Is the failure of visuals to add scientific information congruent with other meaning making strategies underlying the genre?

The answers to the above questions can be provided by looking closely at some examples of visuals in each quadrant. Each visual will be assessed according to the following guidelines:

1. What types of visuals are selected?
2. What do they interact with?
3. Where do they appear in the verbal texts?
4. What other devices (e.g. bold text) are used?
5. Does the caption present an emotional or scientific argument or any other kind of argument? In other words, does the caption have interpersonal, textual, or ideational functions, which create relevant connections with consistencies discussed in the wording?

5.3.2.1 Quadrant A visuals : Climate change

Examples

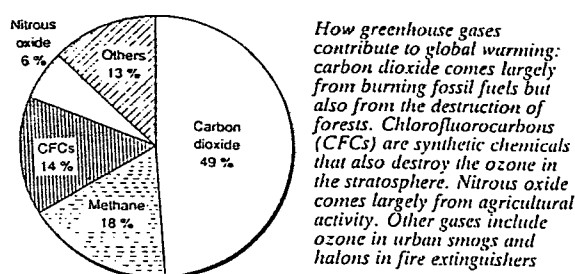


Figure 5.6 CCM3 (greenhouse gas chart) from Methane: The Hidden Greenhouse Gas, *New Scientist*, May 6, 1989. (Methane).

Figure 5.6 is from *Methane* which discusses various aspects of methane such as the sources, and the production of methane. The pie chart shows the degree of contribution of the different greenhouse gases to global warming, one of which is methane. This information was also provided verbally in the element PROBLEM. The wording in the caption is not congruent with the chart, but rather gives some information concerning the sources of greenhouse gases except methane. The readers must seek the information about methane by reading the whole text. Both chart and caption contain a degree of ideational function which can take the readers beyond the information given. It has relatively low interpersonal effect because the chart and the caption present only facts and figures.

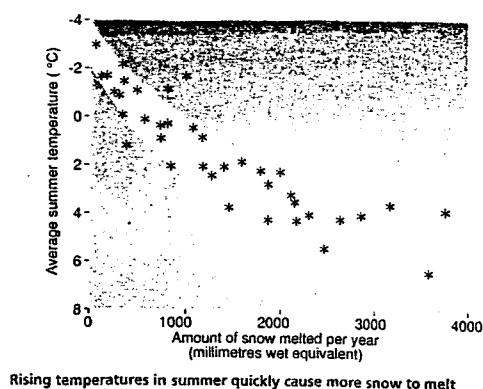


Figure 5. 7 CCI2 (snow levels) from Icy prospects for a warmer world, *New Scientist*, August 8, 1992. (Icy).

This graph is used in the Icy text which discusses the uncertain effect of climate change, on sea levels, viz., whether a warmer future world would thicken or melt polar ice sheets. It is notable that the information provided in the graph does not exactly correspond to the wording found in PROBLEM. The graph illustrates the relationship between temperature and snow melting while the wording of the text is about ice sheets melting at low latitudes. The graph, showing that snow melts more quickly in summer, is scientific evidence from only one side of the debate on the behaviour of the world's ice sheets in a greenhouse world. Therefore, ideationally, it gives the readers some information. In textual terms, it refers to a particular part of the whole text. The graph does not summarise the whole text; rather, it gives readers background knowledge as a basis for understanding why scientists are unsure about the effect of global warming. The wording in the caption is congruent with the idea presented in the graph and both are presented in an objective manner. There is no indication in either caption or picture that they can raise the reader's emotional reaction.

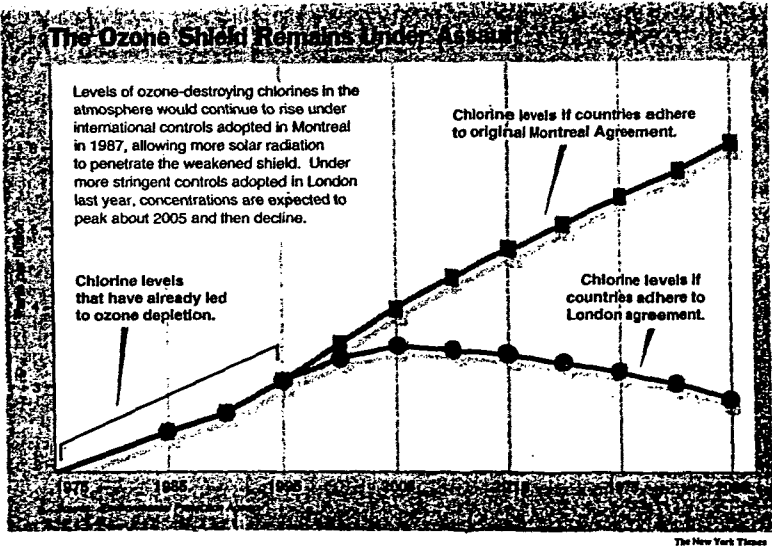


Figure 5. 8 CCOT4 (chlorine levels) from *As the Ozone Thins, the Plot Thickens*, *The Amicus Journal*, Summer 1991.

CCOT4 (Chlorine levels) informs readers about the two scenarios surrounding chlorine levels which could ensue if the Montreal (1987) and the London (1990) agreements on Chlorine reductions were followed. The caption is congruent with the graph. Both the graph and the caption are self-explanatory. By reading the graph and the caption, the readers have two opportunities to absorb the information. The graph can be considered as a useful 'abstract tool' in the sense that the readers can see the information presented visually. Even without the aid of the caption, readers can easily retain the image of the graph and its message in their memory. They are able to recall that the graph splits somewhere in the middle, with one curve pointing upwards to indicate a likely result of adherence to the Montreal agreement, and one pointing downwards indicating a likely result of following the London agreement. The function of the graph is what to achieve is called the ideational meaning. However, the information most relevant to the data is found on the previous page in the element SOLUTION. Textually, the graph and its caption elaborate the point mentioned in SOLUTION and in so doing accentuate the reader's emotional reaction. Because the graph is self-explanatory, it can be put anywhere. Viewed alone, the interpersonal effect of the graph is not very high as it contains no affectual lexis, although readers who thought further would deduce that the chlorine levels still look worrying if people follow the Montreal Protocol only. Yet, the visual is placed after its related text. The reader's emotional reaction would tend to be heightened because the information in BRIDGING and SOLUTION utilise negative affectual lexis. CFCs, an ozone-depleting compound, are made to be considered a "*crime*" and "*the target of a worldwide ban*". Consequently, with a negative feeling about chlorine instilled in their minds, readers who noted that chlorine levels still tend to be higher than the safe level would be apprehensive.

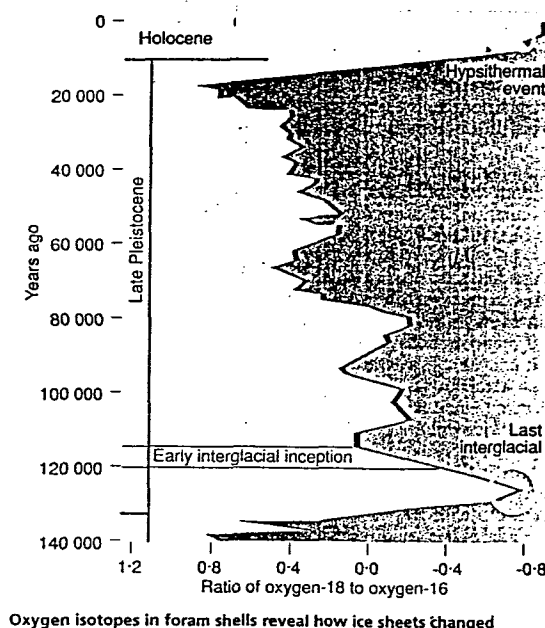


Figure 5. 9 CCI6 (ice age) from Icy prospects for a warmer world, *New Scientist*, August 8, 1992.

This figure presents information in a bar graph in a pictorial or stylised form, that is, by utilising the image of ice sheets to present the expanding and retreating of ice sheets. The jagged ice sheet line is an image which readers can easily store in their memories. However, the caption (*Oxygen isotopes in foram shell reveal how ice sheets changed*) renders little information of which readers can make sense. They need to rely heavily on the information given verbally in BRIDGING in order to understand the meaning of the graph, which suggests that the ice sheets were expanding at a time when the world was warmer than today. The graph provides evidence to support the idea discussed in the written text, that is, that this behaviour contradicts the assumption that warmer temperature causes ice to melt. BRIDGING is found two pages prior to the graph. Given that the concept of warmer temperatures may cause more ice is in itself quite difficult for lay readers to follow, the graph and the wording ought to be adjacent to each other in order to facilitate the reader's understanding. It can be noticed that the ideational and textual meanings of the visual in Figure 5.9 dominate any interpersonal meaning.

5.3.2.2 Quadrant A visuals : Population growth

Examples

Table 1 Population statistics for China and other countries — 1974

Country	Present population (in millions)	Birth rate (per 1000 persons per year)	Death rate (per 1000 persons per year)	Infant mortality rate (per 1000 live births per year)	Population growth rate (per cent per year)	Population under 15 Years (per cent)	Per Capita GNP (US \$)	Population projection for 1985 (in millions)
China	800 (plus 20 or minus 30)	29 (objective "as soon as possible": 18)	13 (objective "as soon as possible": 8)	20-30 (according to region)	1.6 (objective "as soon as possible": 1)	"at least 40"	approx. 185	910 (plus 20 or minus 30)
Rest of Eastern Asia	182	26	10	16	1.7	(without Japan) 40	(without Japan) 325	218
Hong Kong	4.6	20	5	19	2.4 (some immigration)	38	970	6
Outer Mongolia	1.5	42	11	—	3.1	31	460	2
Japan	109	19	7	13	1.2	24	1920	121
Southern and SE Asia	1171	44	17	110	2.7	43	115	1571
India	616	42	17	139	2.5	42	110	808
Pakistan	70.4	51	18	142	3.3	45	100	110
United Kingdom	58	14.9	11.9	18	0.3	24	2270	62

Sources : For China, author's findings and other visitors' records; for other countries, data from Population Reference Bureau, International Planned Parenthood Federation, Population Council, UN Demographic Yearbook.

Figure 5. 10 PGCP1(China statistics) from Of all Things People are the Most Precious, New Scientist, January 1975.

Figure 5.10 is a table showing 1974 population statistics for China and other countries. The main argument in the text (China's population) is that China's population policy appears successful. Even though the text does not refer to other developing countries in great detail, it tabulates national population indicators (such as birth rate, death rate, and population projection) in Asian countries to illustrate that other Asian countries do not compare favourably with China. The table enables readers to know, before they read the text, what issues are likely to be dealt with. With the information presented in tabular form, the readers have a mental tool enabling them to analyse and then deduce further information. It also brings the reader beyond the information given verbally. The graph exhibits high ideational and textual value but no or little interpersonal foregrounding.

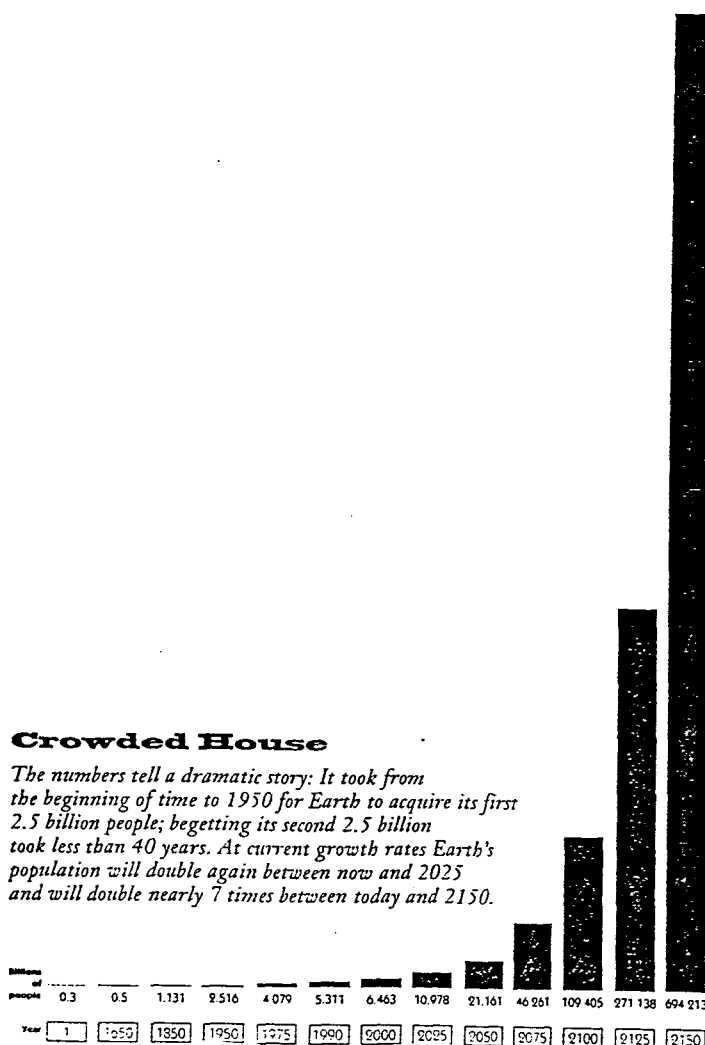


Figure 5. 11 PGMP4 (crowded house) from How Many People Can Earth Hold?, *Discover*, November 1992.

PGMP3 (crowded house) tabulates the earth's population from year 1 with predictions to the year 2150. The readers themselves can deduce from the graph that the growth rates of the world population are dramatically on the rise as the world approaches 2150. The title of the caption (*Crowded House*) gives an impression of overpopulation. The lengthy caption is congruent with the graph, interpreting the information for the reader. The readers, thus, have two modes of information from which they can choose in approaching the graph. They can read the caption first and then the graph or vice versa and they still get the same kind of information, that is,

that phenomenal world population growth rates are anticipated. It may be difficult for the readers to remember the details, but relatively easy to remember the image of the graph. A reciprocation between the non-verbal (a mental tool) and verbal presentation helps the readers to extract information; it allows the readers to have control over the material and the depth of the information.

Providing a better vision of reality through non-verbal representation is a positive step. The readers can work out the mechanics of population growth from the curve of the graph without doing the calculations in the way that a statistician or a demographer would. The same information is provided in written form in the text in PROPHECY, which is at the very beginning of the article, two pages away from the graph. It is worth pointing out that the motif of the wording in PROPHECY and of that in the graph are different. The text cites the United Nations Population Division as an authority, however, the tone of this section of the text still sounds quite subjective. The reader's emotional reaction is intensified because the notion of overpopulation is extended to show that resource depletion will be critical; *By 2025, when my 16-year-old daughter will have finished having whatever children she will have, the world would have 11 billion people, doubling its number today.*

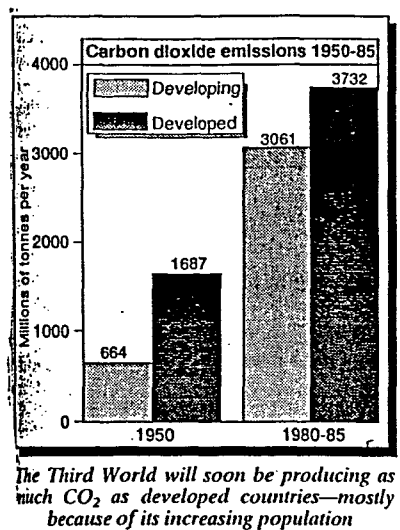
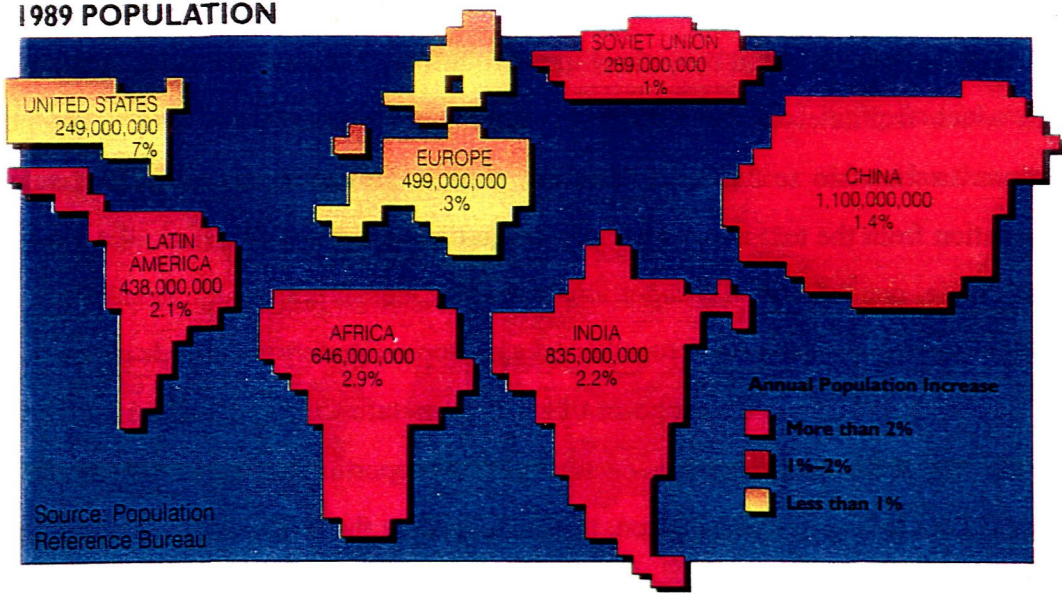


Figure 5. 12 PGTML3 (CO₂ emission) from Too Much Life on Earth? *New Scientist*, May 19, 1990.

Figure 5.12 compares the amount of CO₂ emissions produced by developed and developing countries in 1950 and 1985. The readers first encounter a written explanation about CO₂ emissions in BRIDGING before seeing similar information presented in this graph. The two sources of the projected CO₂ emissions, however, give slightly different information. The wording states the amount of worldwide CO₂ emissions while the graph shows the respective amounts of CO₂ emissions which the so called developed and developing countries have generated. Like the above diagrammatic presentation, this graph performs the function of an ‘abstract tool’, enhancing the readers’ understanding about the relationship between the increase of population and CO₂ emissions. It builds up the reader’s knowledge and also recapitulates the information given in BRIDGING.

While it appears that the graph in Figure 5.12 presents facts and figures objectively, there is, in fact, a subtle manifestation of interpersonal orientation in the graph. The reader’s emotional reaction is triggered at the beginning of the article by the introduction of an iconic photograph depicting overpopulation and then above Figure 5.12 is another photograph depicting smoke rising up from a factory in Brazil. Both photographs represent the conventional versions of the Third World where poverty, overpopulation, underdevelopment, and disease are foregrounded. In this way the reader’s negative stereotypes have been developed before they meet the graph. The graph’s positioning next to the photograph can have a disturbing impact on the readers, whose interpretation of the graph is then very likely to be influenced in a stereotypical way.

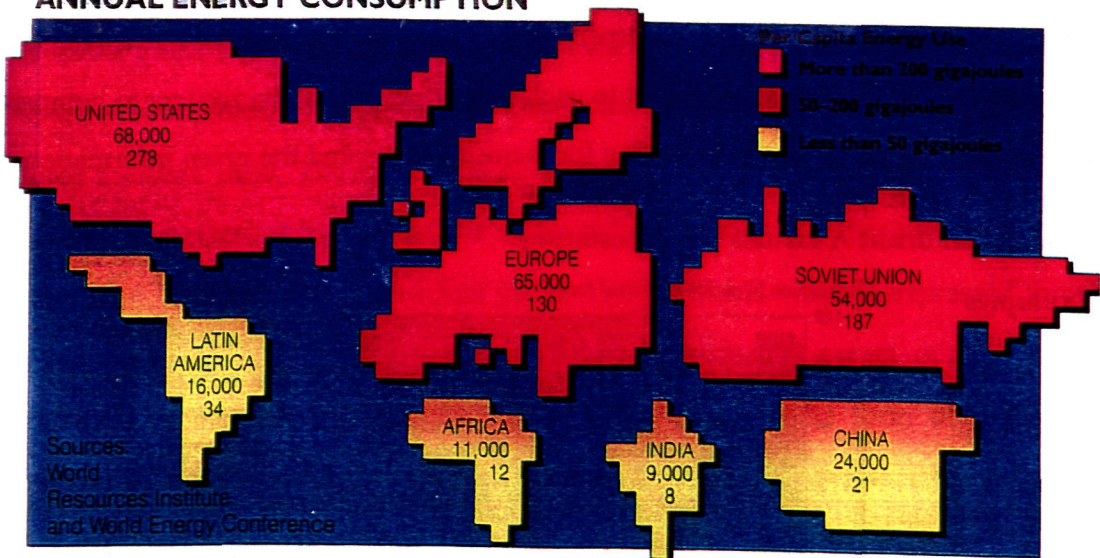
1989 POPULATION



The Third World dominates a map drawn so that land area is proportional to population. The top figures represent total population; the bottom figures, annual growth rate.

Figure 5. 13 PGN2 (1989 population) from *The Numbers Game, Discover*, April 1990.

ANNUAL ENERGY CONSUMPTION



The United States and Europe loom large on a global energy map, drawn so that land area is proportional to energy use. The top figures represent total energy consumption (in petajoules, or 10^{15} joules); the bottom figures, annual consumption per capita (in gigajoules, or 10^9 joules). These figures are based on 1986 data for commercial energy and 1987 data for firewood and charcoal.

Figure 5. 14 PGN3 (energy consumption) from *The Numbers Game, Discover*, April 1990.

Figures 5.13 and 5.14 appear on the same page in the same article, that is ‘Numbers’. Figure 5.13 details populations in the most populous countries and Figure 5.14 details annual energy consumption by each of those countries. They are presented in pictorial form which facilitates the reader’s understanding although readers need to read the captions to be able to interpret the two graphs. However, no additional verbal explanation from the text is required in order to understand the diagrams; the message is a simple one of the disproportionate energy consumption by developed and developing nations. The graphs together take up approximately two-thirds of the page, but they strongly achieve the purposes of all three metafunctions. Ideationally, the fact that the size of the main countries on the maps is proportional, first to the population size and then to energy consumption, gives the readers the total gestalt. In addition to visual cues, the readers are provided with population sizes, annual population growth rates (Figure 5.13), national energy consumption and annual national energy consumption per capita (Figure 5.14). The diagrams restate information in the text, one can find references to the main message in such words as; *The world can support more vegetarian Indians on bicycles than hamburger-eating Americans in cars*. The diagrams give a sense of the totality, assisting the readers to fully comprehend the entire message in the article. Interpersonally, they render personal involvement. Because the two figures are adjacent to each other, they allow the readers to compare the two graphs and deduce information for themselves beyond the given information.

5.3.2.3 Quadrant A visuals : Deforestation

Examples

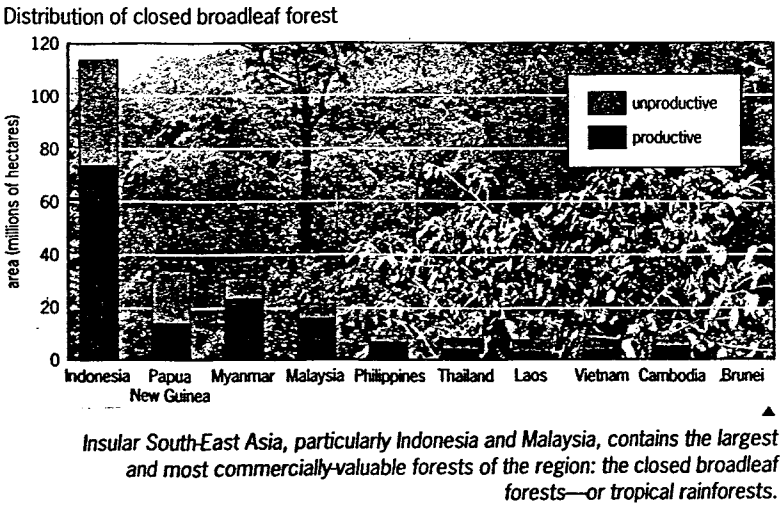


Figure 5. 15 DTR2 (tropical forest area) from South-East Asia’s Trembling Rainforest, *Our Planet*, Vol.3 (4) 1991.

This bar graph presents statistics of South-East Asia's rainforests. It effectively combines a diagram with a naturalised forest image which provides the readers with a high degree of experiential meaning. The caption is congruent with the graph, which presents the readers with the information in two forms. The interpersonal meaning contained in the graph and the caption appear to be very low content as there are no components that amplify the reader's emotional reaction.

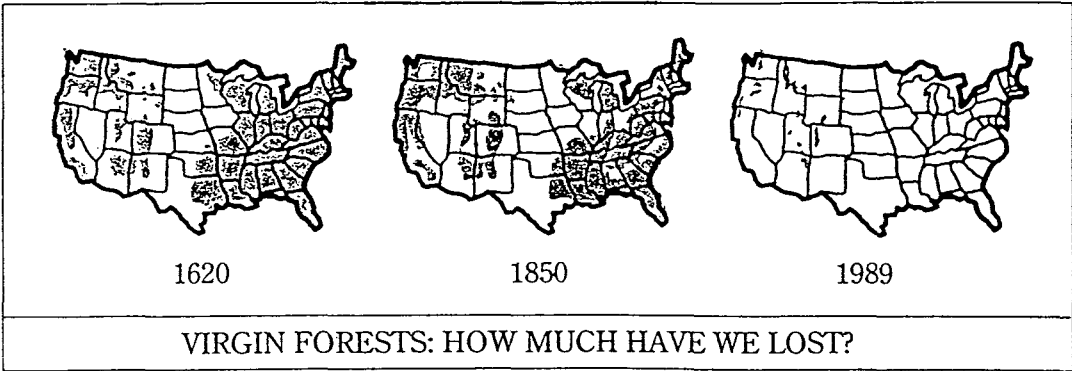


Figure 5. 16 DTA3 (U.S.A.'s forests) from *What Good Are Ancient Forests?*, *The Amicus Journal*, Winter 1990.

DTA3 (U.S.A.'s forests) is one of the visuals that works most effectively as an 'abstract tool'. The three miniature maps of the U.S.A. are placed together side by side to show a longitudinal assessment of how much of the U.S.A.'s forests have been lost since the year 1620. The caption is very concise but gives a comment on the time-based comparison of the maps. The maps and the caption together present very high ideational, interpersonal and textual value. The ideational value is expressed through the comparison of the three maps while the interpersonal aspect of the visual is captured by the employment of *we* within a caption in the form of a rhetorical question which engages the readers emotionally. The maps also take the readers beyond the information given in the maps in that the readers can make their own assessment of the future of the forests based on the three maps. In addition, it comprises an economical use of space because it takes up approximately one quarter of a page, yet provides much information.