They were, by far, the largest and most distant objects that scientists had ever detected: a strip of enormous cosmic clouds some 15 billion light-years from earth. 31) <u>But even more important, it was the farthest that scientists had been able to look into the past, for what they were seeing were the patterns and structures that existed 15 billion years ago.</u> That was just about the moment that the universe was born. What the researchers found was at once both amazing and expected: the US National Aeronautics and Space Administration's Cosmic Background Explorer satellite -- Cobe -- had discovered landmark evidence that the universe did in fact begin with the primeval explosion that has become known as the Big Bang (the theory that the universe originated in an explosion from a single mass of energy).

32) The existence of the giant clouds was virtually required for the Big Bang, first put forward in the 1920s, to maintain its reign as the dominant explanation of the cosmos. According to the theory, the universe burst into being as a submicroscopic, unimaginably dense knot of pure energy that flew outward in all directions, emitting radiation as it went, condensing into particles and then into atoms of gas. Over billions of years, the gas was compressed by gravity into galaxies, stars, plants and eventually, even humans.

Cobe is designed to see just the biggest structures, but astronomers would like to see much smaller hot spots as well, the seeds of local objects like clusters and superclusters of galaxies. They shouldn't have long to wait. 33) <u>Astrophysicists working with ground-based detectors at the South</u> <u>Pole and balloon-borne instruments are closing in on such structures, and may report their findings soon.</u>

34) If the small hot spots look as expected, that will be a triumph for yet another scientific idea, a refinement of the Big Bang called the inflationary universe theory. Inflation says that very early on, the universe expanded in size by more than a trillion trillion trillion fold in much less than a second, propelled by a sort of antigravity. 35) Odd though it sounds, cosmic inflation is a scientifically plausible consequence of some respected ideas in elementary particle physics, and many astrophysicists have been convinced for the better part of a decade that it is true.

31) While there are almost as many definitions of history as there are historians, modern practice most closely conforms to one that sees history as the attempt to recreate and explain the significant events of the past. Caught in the web of its own time and place, each generation of historians determines anew what is significant for it in the past. In this search the evidence found is always incomplete and scattered; it is also frequently partial or partisan. The irony of the historian's craft is that its practitioners always know that their efforts are but contributions to an unending process.

32) Interest in historical methods has arisen less through external challenge to the validity of history as an intellectual discipline and more from internal quarrels among historians themselves. While history once revered its affinity to literature and philosophy, the emerging social sciences seemed to afford greater opportunities for asking new questions and providing rewarding approaches to an understanding of the past. Social science methodologies had to be adapted to a discipline governed by the primacy of historical sources rather than the imperatives of the contemporary world. 33) During this transfer, traditional historical methods were augmented by additional methodologies designed to interpret the new forms of evidence in the historical study.

Methodology is a term that remains inherently ambiguous in the historical profession. 34) <u>There</u> is no agreement whether methodology refers to the concepts peculiar to historical work in general or to the research techniques appropriate to the various branches of historical inquiry. Historians, especially those so blinded by their research interests that they have been accused of "tunnel method," frequently fall victim to the "technical fallacy." Also common in the natural sciences, the technicist fallacy mistakenly identifies the discipline as a whole with certain parts of its technical implementation.

35) It applies equally to traditional historians who view history as only the external and internal criticism of sources, and to social science historians who equate their activity with specific techniques.

Governments throughout the world act on the assumption that the welfare of their people depends largely on the economic strength and wealth of the community. 31 ) <u>Under modern conditions, this requires varying measures of centralized control and hence the help of specialized scientists such as economists and operational research experts. 32 ) Furthermore, it is obvious that the strength of a country's economy is directly bound up with the efficiency of its agriculture and industry, and that this in turn rests upon the efforts of scientists and technologists of all kinds. It also means that governments are increasingly compelled to interfere in these sectors in order to step up production and ensure that it is utilized to the best advantage. For example, they may encourage research in various ways, including the setting up of their own research centers; they may alter the structure of education, or interfere in order to reduce the wastage of natural resources or tap resources hitherto unexploited; or they may cooperate directly in the growing number of international projects related to science, economics and industry. In any case, all such interventions are heavily dependent on scientific advice and also scientific and technological manpower of all kinds.</u>

33) Owing to the remarkable development in mass-communications, people everywhere are feeling new wants and are being exposed to new customs and ideas, while governments are often forced to introduce still further innovations for the reasons given above. At the same time, the normal rate of social change throughout the world is taking place at a vastly accelerated speed compared with the past. For example, 34 ) in the early industrialized countries of Europe the process of industrialization—with all the far-reaching changes in social patterns that followed—was spread over nearly a century, whereas nowadays a developing nation may undergo the same process in a decade or so. All this has the effect of building up unusual pressures and tensions within the community and consequently presents serious problems for the governments concerned. 35 ) Additional social stresses may also occur because of the population explosion or problems arising from mass migration movements—themselves made relatively easy nowadays by modern means of transport. As a result of all these factors, governments are becoming increasingly dependent on biologists and social scientists for planning the appropriate programs and putting them into effect.

In less than 30 years' time the Star Trek holodeck will be a reality. Direct links between the brain's nervous system and a computer will also create full sensory virtual environments, allowing virtual vacations like those in the film Total Recall.

41) <u>There will be television chat shows hosted by robots, and cars with pollution monitors that</u> will disable them when they offend. 42) <u>Children will play with dolls equipped with personality chips,</u> <u>computers with in-built personalities will be regarded as workmates rather than tools, relaxation will be in front of smell television, and digital age will have arrived.</u>

According to BT's futurologist, Ian Pearson, these are among the developments scheduled for the first few decades of the new millennium (a period of 1,000 years), when supercomputers will dramatically accelerate progress in all areas of life.

43) <u>Pearson has pieced together the work of hundreds of researchers around the world to produce</u> <u>a unique millennium technology calendar that gives the latest dates when we can expect hundreds of</u> <u>key breakthroughs and discoveries to take place</u>. Some of the biggest developments will be in medicine, including an extended life expectancy and dozens of artificial organs coming into use between now and 2040.

Pearson also predicts a breakthrough in computer-human links. "By linking directly to our nervous system, computers could pick up what we feel and, hopefully, simulate feeling too so that we can start to develop full sensory environments, rather like the holidays in Total Recall or the Star Trek holodeck, " he says. 44.) But that, Pearson points out, is only the start of man-machine integration: "It will be the beginning of the long process of integration that will ultimately lead to a fully electronic human before the end of the next century."

Through his research, Pearson is able to put dates to most of the breakthroughs that can be predicted. However, there are still no forecasts for when faster-than-light travel will be available, or when human cloning will be perfected, or when time travel will be possible. But he does expect social problems as a result of technological advances. A boom in neighborhood surveillance cameras will, for example, cause problems in 2010, while the arrival of synthetic lifelike robots will mean people may not be able to distinguish between their human friends and the droids.

45) And home appliances will also become so smart that controlling and operating them will result in the breakout of a new psychological disorder—kitchen rage.

Almost all our major problems involve human behavior, and they cannot be solved by physical and biological technology alone. What is needed is a technology of behavior, but we have been slow to develop the science from which such a technology might be drawn. (41) One difficulty is that almost all of what is called behavioral science continues to trace behavior to states of mind, feelings, traits of character, human nature, and so on. Physics and biology once followed similar practices and advanced only when they discarded them. (42) The behavioral sciences have been slow to change partly because the explanatory items often seem to be directly observed and partly because other kinds of explanations have been hard to find. The environment is obviously important, but its role has remained obscure. It does not push or pull, it *selects*, and this function is difficult to discover and analyze. (43) The role of natural selection in evolution was formulated only a little more than a hundred years ago, and the selective role of the environment in shaping and maintaining the behavior of the individual is only beginning to be recognized and studied. As the interaction between organism and environment has come to be understood, however, effects once assigned to states of mind, feelings, and traits are beginning to be traced to accessible conditions, and a technology of behavior may therefore become available. It will not solve our problems, however, until it replaces traditional prescientific views, and these are strongly entrenched. Freedom and dignity illustrate the difficulty. (44) They are the possessions of the autonomous (self-governing) man of traditional theory, and they are essential to practices in which a person is held responsible for his conduct and given credit for his achievements. A scientific analysis shifts both the responsibility and the achievement to the environment. It also raises questions concerning "values". Who will use a technology and to what ends? (45) Until these issues are resolved, a technology of behavior will continue to be rejected, and with it possibly the only way to solve our problems.

Human beings in all times and places think about their world and wonder at their place in it. Humans are thoughtful and creative, possessed of insatiable curiosity. (41) <u>Furthermore, humans have</u> the ability to modify the environment in which they live, thus subjecting all other life forms to their <u>own peculiar ideas and fancies</u>. Therefore, it is important to study humans in all their richness and diversity in a calm and systematic manner, with the hope that the knowledge resulting from such studies can lead humans to a more harmonious way of living with themselves and with all other life forms on this planet Earth.

"Anthropology" derives from the Greek words *anthropos* "human" and *logos* "the study of." By its very name, anthropology encompasses the study of all humankind.

Anthropology is one of the social sciences. (42) <u>Social science is that branch of intellectual</u> enquiry which seeks to study humans and their endeavors in the same reasoned, orderly, systematic, and dispassioned manner that natural scientists use for the study of natural phenomena.

Social science disciplines include geography, economics, political, science, psychology, and sociology. Each of these social sciences has a subfield or specialization which lies particularly close to anthropology.

All the social sciences focus upon the study of humanity. Anthropology is a field-study oriented discipline which makes extensive use of the comparative method in analysis. (43) <u>The emphasis on data gathered first-hand, combined with a cross-cultural perspective brought to the analysis of cultures past and present, makes this study a unique and distinctly important social science.</u>

Anthropological analyses rest heavily upon the concept of culture. Sir Edward Tylor's formulation of the concept of culture was one of the great intellectual achievements of 19th century science. (44) <u>Tylor defined culture as "...that complex whole which includes belief, art, morals, law, custom, and any other capabilities and habits acquired by man as a member of society."</u> This insight, so profound in its simplicity, opened up an entirely new way of perceiving and understanding human life. Implicit within Tylor's definition is the concept that culture is learned. shared, and patterned behavior.

(45) <u>Thus, the anthropological concept of "culture," like the concept of "set" in mathematics, is an abstract concept which makes possible immense amounts of concrete research and understanding.</u>

The relation of language and mind has interested philosophers for many centuries. (41) <u>The</u> <u>Greeks assumed that the structure of language had some connection with the process of thought, which</u> <u>took root in Europe long before people realized how diverse languages could be.</u>

Only recently did linguists begin the serious study of languages that were very different from their own. Two anthropologist-linguists, Franz Boas and Edward Sapir, were pioneers in describing many native languages of North and South America during the first half of the twentieth century. (42) We are obliged to them because some of these languages have since vanished, as the peoples who spoke them died out or became assimilated and lost their native languages. Other linguists in the earlier part of this century, however, who were less eager to deal with bizarre data from "exotic" language, were not always so grateful. (43) The newly described languages were often so strikingly different from the well studied languages of Europe and Southeast Asia that some scholars even accused Boas and Sapir of fabricating their data. Native American languages are indeed different, so much so in fact that Navajo could be used by the US military as a code during World War II to send secret messages.

Sapir's pupil, Benjamin Lee Whorf, continued the study of American Indian languages. (44) Being interested in the relationship of language and thought, Whorf developed the idea that the structure of language determines the structure of habitual thought in a society. He reasoned that because it is easier to formulate certain concepts and not others in a given language, the speakers of that language think along one track and not along another. (45) <u>Whorf came to believe in a sort of linguistic determinism which, in its strongest form, states that language imprisons the mind, and that the grammatical patterns in a language can produce far-reaching consequences for the culture of a <u>society</u>. Later, this idea became to be known as the Sapir-Whorf hypothesis, but this term is somewhat inappropriate. Although both Sapir and Whorf emphasized the diversity of languages, Sapir himself never explicitly supported the notion of linguistic determinism.</u>