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OPINION

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Science and culture

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Who can define exactly what the term "culture" means? Intuitively, everybody understands to what it refers; nevertheless, conveying its meaning into words is a most complex task. Dictionaries give several meanings to this term, including "the act of developing the intellectual and moral faculties especially by education" and "acquaintance with and taste in fine arts, humanities, and broad aspects of *science* as distinguished from vocational and technical skills" [Merriam Webster's Collegiate Dictionary, 10th edn (1995) Merriam-Webster, Springfield, Mass.]. Academic definitions, however, tend to be stiff and hardly ever satisfactory. I prefer a definition that has been embedded in my memory since I first heard it: "Culture is what remains once you forget what you learnt." It is the remains or residues that persist in some hidden corner of your brain challenging the ravages of time and oblivion. To a great extent, cultural background determines one's behavior and the guidelines that one follows in life.

At first sight, it seems as if the term "culture" is synonymous with "deep learning". Accordingly, the most learned people should be the most cultivated. I do not think so, however. The acquisition of one's cultural background has hardly anything to do with the titanic effort which is needed to master the burden of memory-related, unnecessary, dogmatic information with which young students are crammed. Unfortunately, increasingly demanding examinations do not correspond with an assessment of either the value of intelligence or the ability to reason. In fact, the foundations of an appropriate cultural background rely mostly on the development of other, more gratifying qualities. These include the selected reading of masterpieces of the literature, the pleasure of looking at the historical human legacy made up of architecture and other art works, the delight of listening to sublime music created by ingenious composers, and maybe to be aware of the latest trends in philosophy and economics. But what about being aware of the latest scientific discoveries?

Traditionally, scientific knowledge was not a part of a cultural background. The negative perception that society has of science has contributed to this circumstance. The archetypal respectful intellectual was someone with a humanistic background – literature, philosophy arts, and maybe even law; knowledgeable in social and political affairs; able to have an influence on certain matters and trends of his time. In addition, the intellectual might be – and in fact he would be so – completely illiterate in scientific matters. In some countries, including Spain, well-respected intellectuals despised research. Sentences such as "let the others invent" or " in Spain, doing research means crying" are the clear reflection of such a contemptuous attitude. The classical image of the venerable scholar researcher has persisted. Nowadays most media still separate "cultural" from "scientific" items, based on the assumption that culture and science deal with different matters.

The great scientific, technical revolution, with no precedent in history, which has marked the development of the twentieth century, has reversed the established order. The application of scientific advancements has greatly changed everyday life, especially in the so-called developed Western world. Science is no longer the job nor the hobby of a few eccentric, half-lunatic geniuses spending their time dealing with absurd matters, unintelligible to the profane. Their work was observed by their coevals with curiosity, if not with concern about the danger that such crazy minds could generate. More than frequently, scientific discoveries have not been appreciated in their proper context, and the lives of the respective discoverers have passed unnoticed. Others, less fortunate have been persecuted and condemned because they put the established values at risk.

A list of inventions and findings of the last century that have originated from new scientific ideas could be

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interminable; but electricity, photography and cinema, the telephone, the car, the airplane, household appliances, and the computer, must be mentioned. Basic conceptual advancements have led to specific applications including new surgical and diagnostic techniques, the progress of optics and of nuclear physics, and the industrial production of antibiotics and other essential biological products. Although superficially unrelated, the contribution of science has been decisive in the establishment of a new economic and social order. The control of infectious diseases has contributed to a decrease in the birth rate and the subsequent incorporation of women into the labor force. The availability of more efficient drugs and the improved quality and quantity of food have, in many countries, brought about higher life expectancies and the aging of the population. This is a new challenge for governments and public health systems. In any case, we should bear in mind that the benefits of applied science are limited, and that most of the world's population is unaware of scientific progress and continues to live in extremely poor conditions. These enormous differences are the ultimate causes of serious hostilities around the world and increasing international terrorism. Furthermore, the perverse use of science to produce weapons of mass destruction has provided an apocalyptic vision of the age-old confrontation between the rich and the poor.

Scientific knowledge must be made an essential ingredient of people's cultural background. In a world in which communication has greatly increased, where information is indispensable, science cannot remain apart from social events. Nevertheless, the consequences of scientific progress have been more obvious in people's day-to-day lives than in their ways of thinking. Public opinion maintains – to a great extent – a hostile, reserved attitude regarding science. And this opinion is mainly a result of scientific illiteracy. Several surveys carried out in the United States during the 1990s concluded that a significant part of the population remained ignorant of issues such as the origin of life, the nature of the mechanisms of biological inheritance, nuclear fusion, and the mode of action of antibiotics.

Scientists must assume part of the responsibility for such extensive illiteracy. Their often cold, distant attitude has created a culture broth consisting of a mixture of skepticism and the ready acceptance of popular superstition as fact. Science advances at an accelerated rhythm, revealing new horizons but also raising serious ethical and legislative concerns. Profound, significant issues such as the proper uses of stem cells and the human genome, and the applications of cloning are now the focus of a debate about which society must make a decision, based on the rigorous knowledge provided by experts. Because, at the turn of the twenty-first century, there is no doubt that science has become a substantial ingredient of culture.