

tion, and in the history of the development of forms and methods to satisfy IN with available information, various critical situations have arisen (which were overcome, for example, by the invention of writing, paper, printing, etc.). As for the second approach, there is always too little information. However, in both cases society is ready to invest more and more resources for science (to stimulate the development of new information) as well as for information activity (to stimulate its efficient utilization).

The idea of too little information has constantly served as a basis for the development of science, and since the beginning of the 20th century it has resulted in exponential growth of scientific activity, including capital investment in science and the number of scientists. This in turn inevitably resulted in the phenomenon that is often called the information explosion (the exponential growth of information during a particular segment of time). In the following we will be interested in satisfying an IN with the help of information activity, which means the historical development of this activity will be of particular interest. We will also consider some of the previous information crises, the conditions that spawned them, and the methods for overcoming them. This historical background can prove to be useful for understanding the modern information crisis, which will also be considered.

3.2

Information Activity and Information Crises

Chapter 2 showed that information is always necessary for human survival. However, how far back can we trace the history of information activity? It is difficult to answer this question, but apparently the first result of this activity was the creation of language. *Language was created in connection with the growth of IN, on the one hand, and with accumulation of information (experience) on the other. It had to provide an instrument (means) with which it was possible to satisfy an IN more successfully and to contact one's contemporaries.*

Try to imagine the beginning of information activity, that is, the process of creation of language. Many millennia have passed since the time when our distant ancestor, fearfully looking around, raised himself on his rear extremities, and awkwardly swinging, learned to move on them alone. This was a significant event because the forward extremities turned into hands and our ancestor's horizon was significantly widened. Rather quickly he discovered that he could communicate his desires to those like him. The first people probably used their hands for these purposes. Whoever was strongest was listened to more attentively and understood. Undoubtedly this method was being developed when someone first had the sense to grab a stick. With its help, our ancestor much more successfully made his simple views on life understood by his kinsmen.

Gradually this extremely indelicate, but mainly inconvenient method to transfer information began to be seen as not the only option possible. It turned out that it was possible to express one's desires and intentions by an approving growl, threatening scream, or one-syllabled cry. Gradually these sounds were put together, and the animal-like scream was transformed into the resemblance of speech. Cave people began to invent the first words.

Clearly, the words and their meanings were developed jointly by many people over a long period of time. The vocabulary accumulated very slowly (many linguists believe that the formation of language takes hundreds of thousands of years). However, even with the small number of words that our ancestors had mastered, they could exchange a lot of information. For example, it has been determined that in the biblical Ten Commandments, people used only about 300 words. For the American Declaration of Independence, 1500 words were used. And a report on the establishment of new prices for coal in the United States, published at the end of the 1960s, contains 26,811 words.

It is believed that language finally developed approximately 25,000 years ago. With the existence of language, it became significantly easier to satisfy an IN. In other words, a person's chances for survival significantly improved. Due to the constant accumulation of information, the problem of storage arose. People were used as the first "warehouse" of information. Such warehouses were the oldest person of the tribe, the chief sorcerer, the high priest, and so forth. Possession of information was one of the important privileges and functions of these people. However, a "document" in the form of a mortal had an essential deficiency—upon this warehouse's death information often disappeared. A much more reliable document was necessary as more and more information was accumulated over time, and the need for it only increased. Thus, writing began to be developed, which emerged about six thousand years ago.

With the creation of writing, humankind was faced with a new problem—developing an efficient information carrier. Rock faces or cave walls did not prove to be very convenient. Perhaps the first artificially created carriers were clay tablets, which are known to have been used from the fourth millennium B.C. (Sumerian tablets). Since that time, information activity was much more explicit. It was necessary to know how to produce these tablets, to prepare an instrument for applying the text, to know how to preserve them (to protect them from rain, cracking, splitting, and crumbling) and to know how to use them.

How might a society overcome the crisis caused both by the growth in the amount of information accumulated by humankind and by the ever-increasing demand for it. The concrete information crisis was that the available form of information storage (a human being) became an obstacle in satisfying an IN because it could not cope with the assigned task. It was impossible to improve this form; therefore, it was necessary to replace it. Thus the creation of the written document proved to be not only the method for overcoming the informa-