the shift key on a keyboard, or more precisely a caps-lock key—which doubles up the meanings of the remaining codes. Braille uses a similar method for extending the range of characters represented.

Coding for the modern era

As we entered the computer age in the 1960s, new coding systems were defined. In fact there were two main rival schemes, EBCDIC (pronounced *ebsidik*, for IBM machines) and ASCII (pronounced *askey*, for all other computer manufacturers). I will leave EBCDIC aside, but ASCII is worth some discussion. The American Standard Code for Information Interchange is a more ambitious system than Baudot, and was used for multiple purposes in the transmission and storage of data in the early computer age, and in fact is still in use. It is a seven-bit code, allowing a total of 132 different combinations. These include the 26 letters, in both upper and lower case (making 52), the ten digits (62), a significant number of punctuation marks and special symbols (96), and 32 codes reserved for control purposes. Minor variations on this system were defined for various European languages with features not seen in English, e.g. accented characters. More systematic variation is provided for by the scheme known as ANSI, which started from ASCII, but has different code pages for different languages. Each code page provides a complete coding of a set of characters for a language—but the computer must 'know' which code page is in use to interpret ANSI correctly.

The coding scheme known as Unicode, which is currently becoming the standard for many purposes, is a much larger set. It includes not only all the characters for other alphabets than the Latin one, e.g. Greek, Russian and Arabic, but also characters for non-alphabetic languages, e.g. Japanese, Chinese. This is a fascinating development: the *idea* of a coding of characters could only have developed in the context of a small alphabet; but given the idea, it now becomes possible to apply it to much larger character sets. Unicode in its original full form requires 16 or 32 bits per character, but there are alternative encodings for the same scheme, which allows the old ASCII character set to be represented as it traditionally was, in eight bits. (Yes, I know I said seven. ASCII is a seven-bit code, but since most computers operate with multiples of eight bits, ASCII is usually embedded in eight bits.)

Although there remain some languages and scripts in the world that have not yet been incorporated into the scheme, nevertheless we seem (in the early twenty-first century) to be approaching the state where any text character in any language can be represented by means of a standard binary code. This is a remarkable achievement.

The last alphabet

The bit—the binary digit, a character from a two-letter 'alphabet'—might be seen as the final stage of a process that began when we started inventing systems for writing, something like five-and-a-half millennia ago. At the start of the third millennium CE, we realise that we can represent *any* record by means of bits. Not just language, but also, as we shall see in later chapters, numbers, images, sounds, moving pictures, and so on. The universal alphabet consists of just two symbols, a zero and a one.

But it is not just a matter of representation. We have already seen how the alphabet has helped us towards new ways of *doing* things with information. Printing, and thus the publishing revolution that followed it; and Morse code, and the telegraphic revolution that followed that: each of these would have been inconceivable if we had not invented the alphabet in the first place. Now, in the new revolution, the biggest changes have come about in the ways of *processing* information: of systems and methods and mechanisms that operate on information rather in the way that a loom operates on the raw material of thread to produce something quite different, cloth. Sending messages was just one such operation; but the possibilities are almost limitless.

The strange story of the keyboard

I am writing this text by means of a device that has become so common that it passes almost without notice: a QWERTY keyboard. This is something else that the alphabet made possible. Although my keyboard has rather more than 26 keys, its existence depends on the small number of possible characters—a keyboard with a key for each of the tens of thousands of distinct Chinese characters is quite inconceivable.

We have had keyboards for musical instruments for centuries. But the