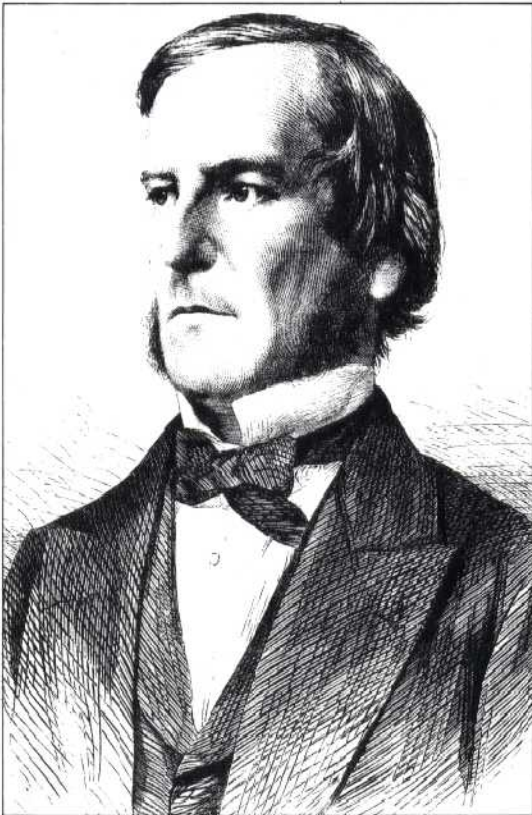


# The Laws Of Thought

A century before the electronic computer was invented, George Boole published his ideas on mathematical logic



COURTESY OF THE ROYAL SOCIETY

In 1815, the year of Napoleon's defeat at the Battle of Waterloo, another significant event in the history of mankind occurred.

George Boole was born in Lincoln, England. The son of a cobbler, he was to become one of the geniuses behind the invention of the computer. Although he died in 1864, a century before the microcomputer revolution began, the modern computer could not have evolved without his ideas.

Boole knew that the processes of reasoning that people carry out in their everyday lives can be described in terms of the formal logic pioneered by the Greeks. He believed that if you tried hard enough you could go further and express human reasoning in a mathematical way. Boole set out to do just this; he taught himself mathematics and began his research into the logic of human decisions.

## Sets Of Information

Imagine one night you go to a party. You want to dance so you find the room where people are dancing and look for a partner.

The people in the room are either dancing or

they are not dancing — they cannot be doing both. The partner you approach must be either a boy or a girl. Obviously, a person can be male or female but not both.

Now Boole would have made a different approach. He would have seen a dance floor containing 'sets' of people, the male set and the female set, or M and F. Boole would also have seen D and W, or the set of people dancing and the set of people waiting to dance.

His partner would have to satisfy two conditions: be a female and also be waiting to dance. Boole noticed the importance of the 'and' connecting the two conditions and gave it a symbol — an upside down U. He was then able to list the set of possible dance partners as  $F \cap W$ .

However, if he did not want to dance but just chatter to a friend, he could choose anyone from M or F because these two sets include everyone in the room. Again, he saw the importance of the innocent looking 'or' in the condition and gave it the symbol  $\cup$ . So in his logical algebra  $M \cup F$  contains all the males and all the females in the room.

The logical gates found in computers are named after Boole's symbols, such as AND and OR. In BASIC programming we will soon discover two useful commands called AND and OR. But before we pursue these there is a very picturesque interpretation of Boolean logic — invented by the English mathematicians John Venn (1834–1923) and Charles Dodgson (1832–1892), better known as the author Lewis Carroll.

Let us take a practical problem. Imagine you have stored a list of your acquaintances in the memory of your computer. With each name is listed other information — such as the telephone

### George Boole 1815-1864

George Boole was born before electronic computers were ever imagined yet he is one of the founders of the mathematical logic used by today's computers. He was the son of a cobbler and taught himself mathematics in his spare time. He was convinced that the everyday decisions that people make were based on reason, and that this reason could be refined into mathematical logic. He published his ideas in 1847 and almost overnight became famous and was invited to become the first professor of mathematics at the newly founded University of Cork

### The Friends' Program

```

10 DIM NS(10),DS(10),FS(10),TS(10),CS(10)
15 REM NAME, TEL. NO., FRIEND?, TENNIS?, CAR?
17 PRINT "ENTER DETAILS IN THE FORM:"
18 PRINT "NAME, PHONE, YES/NO, YES/NO, YES/NO"
20 FOR K = 1 TO 10
30 INPUT NS(K),DS(K),FS(K),TS(K),CS(K)
40 NEXT K
45 REM SEARCH ROUTINE
50 FOR J = 1 TO 10
60 IF FS(J)="YES" AND TS(J)="YES" AND CS(J)="YES" THEN GOSUB 100
70 NEXT J
80 END
100 PRINT NS(J),DS(J)
110 RETURN
    
```