together with the matrix which contained them:

ϕ but ψ. *16.3*

The Greek letters 'ϕ' and 'ψ' are called *sentence variables*, which means that they are symbols standing for sentences. Here they mark the holes where the constituent sentences should go. We shall also use the Greek letter 'χ' as a sentence variable; we may add subscripts too, as in 'ϕ_1', 'ϕ_2', etc.†

There are several different senses in which a symbol can be used to 'stand for' expressions. Rather than catalogue these senses, we shall introduce them as and when they are needed; the context should always make clear what is meant. Where a variable serves to mark a hole that can be filled with an expression of a certain sort, the variable is said to have a *free* occurrence; in (16.3) both the occurrences of variables are free.

The matrix (16.3) is an example of a *sentence-functor*. More precisely, a *sentence-functor* is defined to be a string of English words and sentence variables, such that if the sentence variables are replaced by declarative sentences, then the whole becomes a declarative sentence with the inserted sentences as constituents. Here is a selection of sentence-functors:

It's a lie that ϕ. *16.4*
Many authorities have noted that ψ. *16.5*
She went and bought some fish, then ϕ. *16.6*
If ϕ, then ψ. *16.7*
ϕ because ψ, unless χ. *16.8*
Since he swears that ψ, we can take it that ψ. *16.9*

Every occurrence of a sentence variable in a sentence-functor is free.

Sentence-functors are classified by the number of different sentence variables they contain. The three examples (16.4)–(16.6) each contain just one sentence variable, so that they are described as *1-place* sentence-functors. (16.3) and (16.7) are *2-place*, while (16.8) is *3-place*.

Note that (16.9) is *1-place*, since only one sentence variable occurs in it, even though it occurs twice. When a sentence variable is repeated in a sentence-functor, this is understood to mean that the sentence variable must be replaced by *the same sentence at each occurrence*. For example the holes in (16.9) can be filled to form the sentence

† ϕ pronounced *fie*; χ pronounced *khi*; ψ pronounced *psi*; all rhyming with *sky*.

Since he swears that he was at home, we can take it that he was at home. *16.10*

They cannot be filled to produce

Since he swears that he was at home, we can take it that he is not guilty. *16.11*

Exercise 16A. Analyse the following sentence into one 4-place sentence-functor (with sentence variables 'ϕ_1', 'ϕ_2', 'ϕ_3' and 'ϕ_4') and four constituent sentences:

I scattered the strong warriors of Hadadezer, and then at once I pushed the remnants of his troops into the Orontes, so that they dispersed to save their lives; Hadadezer himself perished.

Returning to example (16.1), we see that this sentence is true precisely when both the constituent sentences (16.2) are true. In fact if we replace 'ϕ' and 'ψ' in (16.3) by declarative sentences, then the whole resulting sentence will be true precisely if both the added sentences are true. We can express this in a chart, as follows:

ϕ	ψ	ϕ but ψ.
T	T	T
T	F	F
F	T	F
F	F	F

16.12

Here T = True and F = False; thus the third row of the table (16.12) indicates that if in 'ϕ but ψ' we replace 'ϕ' by a false sentence and 'ψ' by a true one, then the whole resulting sentence is false. This chart (16.12) is called a ***truth-table*** for the sentence-functor (16.3).

Likewise we can write down a truth-table for the sentence-functor

It's true that ϕ. *16.13*

as follows: