

order, &c.; and, secondly, those artificial forms, or symbols, which thought has the power of creating for itself at pleasure, and substituting as representatives by the aid of memory, for combinations of those primary objects and of its own conceptions,—either to facilitate the act of reasoning respecting them, or as convenient deposits of its own conclusions, or for their communication to others. Such are, first, *language*, oral or written; its conventional forms, which constitute grammar, and the rules for its use in argument, in which consists the logic of the schools; secondly, *notation*, which, applied to *number*, is *arithmetic*,—and, to the more general relations of abstract quantity or order, is *algebra*; and, thirdly, that higher kind of logic, which teaches us to use our reason in the most advantageous manner for the discovery of truth; which points out the criterions by which we may be sure we have attained it; and which, by detecting the sources of error, and exposing the haunts where fallacies are apt to lurk, at once warns us of their danger, and shows us how to avoid them. This greater logic may be termed *rational*;\* while, to that inferior department which is conversant with words alone, the epithet *verbal*† may, for distinction, be applied.

(15.) A certain moderate degree of acquaintance with abstract science is highly desirable to one who would make any considerable progress in physics. As the universe exists in time and place; and as motion, velocity, quantity, number, and order, are main elements of our knowledge of external things and their changes, an acquaintance with these, abstractly considered (that is to say, independent of any consideration of the particular things moved, measured, counted, or arranged), must evidently be a useful preparation for the more complex study of nature. But there is yet another recommendation of such sciences, as a preparation for the study of natural philosophy. Their objects are so definite, and our notions of them so distinct, that we can reason

\* *Λογος*, *ratio*, reason.

† *Λογος*, *verbum* a word.