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Syllogistic (argumentation; also used as a noun). SYLLOGISM (q.v.).

Symbol [Gr. σύμβολον, a conventional sign, from σύν + βάλλειν, to throw]: Ger. *Symbol*; Fr. *symbole*; Ital. *simbolo*. (1) A SIGN (q.v.) which is constituted a sign merely or mainly by the fact that it is used and understood as such, whether the habit is natural or conventional, and without regard to the motives which originally governed its selection.

Σύμβολον is used in this sense by Aristotle several times in the *Peri hermeneias*, in the *Sophistici Elenchi*, and elsewhere.

(2) An algebraic character. (C.S.P.)

Symbol (and **Symbolic**) [Gr. σύν + βάλλειν, to put together, compare]: Ger. (*symbolisch*); Fr. (*symbolique*); Ital. (*simbolica*). (1) An object which stands for some other object or idea; the former is said to be 'symbolic' of the latter. Cf. SIGN, and SIGN-MAKING FUNCTION.

(2) In aesthetics, an object which, apart from its own immediate and proper significance, suggests also another, especially a more ideal content which it cannot perfectly embody.

The symbol may be either natural: as light is a symbol of truth; or traditional and conventional: as the cross is a symbol of sacrifice.

The conception of art as symbolic goes back at least to Plotinus, but the term seems to have come into general aesthetic currency through Goethe and Schlegel—the latter declaring it to be (in sense 1, above) the essence of all art. Hegel made the symbolic in sense (2) the principle of oriental as compared with Greek art. Vischer laid special stress on the symbolic (significant) character of art, as against the Formalists. Recently, the psychology of symbolization has received special treatment. Fechner explained it as association. Others have considered it as an investiture of the object with the observer's own idea and feeling in a more intimate manner than is implied by the term association, and have sought for terms expressing this, as 'mitfühlen,' feeling with (Lotze), 'einfühlen,' feeling into (R. Vischer, Fr. Vischer), a lending or animating (Leihen, Beseelung; Fr. Vischer), fusion (Verschmelzung; Volkelt). According to Lotze we live over again in the object the motion to produce it, &c. Groos (*Play of Man*, Eng. trans., 31) makes eye-movements and other 'inner imitations' 'symbolic' of the real movements of imitation. See SYMPATHY (aesthetic).

Literature (to 2): HEGEL, Aesthetik, ii. Th., i. Abth.; STERN, Einfühlung u. Association in d. neu. Aesth. (1898); FECHNER, Vorschule d. Aesth. ii; LOTZE, Gesch. d. Aesth., 74 ff.; FR. VISCHER, Aesthetik; Krit. Gänge, v, vi; and Das Symbol, Altes u. Neues (1889); R. VISCHER, Über d. optische Formgefühl (1873); VOLKELT, Der Symbolbegriff in d. neuesten Aesth. (1876); LIPPS, Raumästhetik u. geometrisch-optische Täuschungen (1897); VOLKELT, Zeitsch. f. Philos., cxiii. 161–79; STERN, ibid., cxv. 193–203; KÜLPE, Zeitsch. f. wiss. Philos., xxiii. 145–83; TURNARKIN, Arch. f. Gesch. d. Philos., xii. 257–89; FERRERO, I simboli (1892). Cf. also FORM, BALANCE, SYMMETRY. (J.H.T.)

Symbolic Function: no foreign equivalents in use. The function whereby a mental result primarily referring to one set of objects is transferred to another set of objects; the first set is said to be symbolic of the second.

SYMBOL (q.v.) is frequently used in a very wide sense as equivalent to any kind of sign. But it seems desirable to limit its application in psychology to cases in which the sign is provisionally substituted for the thing symbolized. Words are not substitute signs in this sense; they are means by which we attend to what is signified, not themselves objects of attention. Cf. SIGN-MAKING FUNCTION, and SIGN (for a more special meaning of symbol). (G.F.S.)

Symbolic Logic or **Algebra of Logic**: Ger. *Algebra der Logik*; Fr. *logique symbolique ou algorithmique, algèbre de la logique*; Ital. *logica simbolica*. Symbolic logic is that form of logic in which the combinations and relations of terms and of propositions are represented by symbols, in such a way that the rules of a calculus may be substituted for actively conscious reasoning.

An algebra of logic enables us to disengage from any subject-matter the formal element which gives its necessary (apodictic) force to reasoning; it is therefore nothing but an exact logic, that is to say, the complete realization of the purpose of formal logic (cf. PROPOSITION). The ordinary formal logic has, from the earliest times, substituted symbols (viz. the letters of the alphabet) for significant terms, and has thus added much to the facility with which the validity of arguments can be tested; symbolic logic goes a step further, and adds symbols to stand for combinations of terms, or functions of terms, and statements of relations between terms. The aid which is thus given to logic, not only in the carrying out of complicated trains of

reasoning, but also in the exact analysis of the various steps involved, is very great.

Several systems of symbolic logic have been proposed within the last half-century (see literature). We shall here describe only one—that of Boole, as reformed and developed by Schröder, Peirce, and others. This system is not based exclusively upon the consideration of the extension (application) of terms and of propositions, but covers all relations of intension (SIGNIFICATION, q.v.) as well. It is, however, more convenient, when formulae are to be expressed in words, to use the language of one or the other of these two parallel interpretations exclusively; that of the application-interpretation will be used in what follows.

Throughout symbolic logic there is an exact analogy between terms and propositions, so that the same theorems (or formulae) apply to both; it is not a case of two parallel systems (a calculus of concepts and a calculus of propositions), but of a single system susceptible of a double interpretation. In what follows, the letters of the alphabet stand for either concepts or propositions[1].

The algebra of logic rests upon two *relations*—that of inclusion (or subsumption, or sufficient condition) and that of equality, of which the first only is fundamental—and upon three operations—aggregation (or logical addition), composition (or logical multiplication, as it has been unfortunately named, upon a false analogy), and negation. Of the three operations, negation together with either of the other two would suffice for the algebra (though facility of expression is greatly increased by admitting all three of them); hence one relation (or form of statement) and one operation, together with negation (applied not only to terms but also to the assumed form of statement and to the assumed operation), are all that are absolutely essential to the building up of the theory.

The relation of inclusion, which is written $a \leqslant b$, signifies that the class a constitutes a part (or it may be the whole) of the class b, or that the quality-complex a is indicative of the quality-complex b, or that the statement a involves the statement b. Conceptual Interpretation: The a's are all b's; Propositional Interpretation: If a is true b is true, or, a entails b. The relation of equality, or identity, which is written $a = b$, signifies, for one thing, that the two classes a and b are identical (made up out of the same elements). It may be defined as equivalent to the system of two inverse inclusions

$$(a \leqslant b)\,(b \leqslant a);$$

C.I.: All a is b and all b is a; P.I.: a entails b and b entails a. In the case of propositions, logical equality is called *equivalence*. Multiplication and addition are thus defined in terms of classes: the sum of two classes is the class which contains all the elements of each (without repetition); the product is the class which contains all the elements which are common to both. Formally these operations may be defined as follows:

$$(a \leqslant c)\,(b \leqslant c) = (a + b \leqslant c);$$

C.I.: If a is c and b is c, what is either a or b is c, and conversely; P.I.: If a implies c and b implies c, whatever implies either a or b implies c, and conversely.

$$(c \leqslant a)\,(c \leqslant b) = (c \leqslant ab);$$

C.I.: If c is a and c is b, c is a and b, and conversely; P.I.: If c implies a and c implies b, c implies both a and b, and conversely. It will be seen that the signs $+$ and $\times$ (understood in the form ab) correspond to a certain extent to the conjunctions *or* and *and*, but not completely; for instance, $a + b \leqslant c$ must be read '*a and b* are *c*,' but by throwing the first member of this inclusion into a subordinate predicate (which can always be done without change of meaning) it may be read 'What is *a or b* is *c*.' The inclusion $ab \leqslant c$ can be read '*a* which is *b* is *c*,' or '*b* which is *a* is *c*,' or 'What is *a* and *b* is *c*.'

It is necessary to define at once two special terms which play an important rôle in symbolic logic, the logical *zero* (0) and the logical *everything* (∞ or 1). They are defined formally as follows:

$$0 \leqslant x, \quad x \leqslant 1,$$

where x stands for any term whatever, or for any proposition whatever. In the conceptual interpretation, 1 is *everything* which *exists*, or the universe of discourse, and 0 is *nothing*, or *the non-existent*; in the propositional interpretation, 1 is the aggregate of those states of things which *occur*, or are *true*, and 0 is the *false*, or the *non-occurrent*. The special terms may equally well be defined as follows:

$$x + 0 \leqslant x, \quad x \leqslant x \times 1;$$

we should then say that 0 is that term which, when added to any term, makes it no greater than it was before, and that 1 is that term which, when compounded with any term, makes it no less than it was before. From either of these pairs of definitions the other

[1] Abbreviations: C. I. = conceptual interpretation; P. I. = propositional interpretation.