

seen fragmentarily in the reversal, and even the up-or-down-turning, of single letters, figures, &c., and in the writing with the left hand of many adults who write normally with the right hand. A simple test is: starting with both hands together before the body, trace one's autograph naturally with each index-finger in mid-air. In many cases of right-handed persons the left hand then inscribes mirror writing more naturally than correct writing, performing movements symmetrical with those of the right hand, rather than analogous to them; that is, moving away from the right hand rather than following it.

Mirror writing furnishes an important problem to theorists on HANDWRITING (q.v.). It is probably due in children to the incomplete association of the series of hand-movement sensations with the control series of visual sensations. In some the hand unaccustomed to writing reproduces the muscular series to which the other hand is accustomed (symmetrical accompanying movements); this is in persons who think of writing mainly in terms of the muscular sensation series. Others, who do not produce mirror writing, think on the contrary of the visual form of the words, and so reproduce that, giving a correct imitation of the other hand (analogous accompanying movements).

Literature: see HANDWRITING, GRAPHOLOGY, and Agraphia under SPEECH AND ITS DEFECTS. (J.M.B.)

Misdemeanour (in law) [OF. *mesdemener*]: Ger. *Vergehen*, *Uebelverhalten*; Fr. *délit*, and for petty offences *contravention* (*Code Penal*, 1); Ital. *contravvenzione*. A crime less than a felony; a minor offence. 'In common usage the word "crimes" is made to denote such offences as are of a deeper and more atrocious dye; while smaller faults and omissions of less consequence are comprised under the gentler name of "misdemeanours" only' (Blackstone's *Commentaries*, iv. 4). (S.E.B.)

Misology [Gr. *μισεῖν*, to hate, + *λόγος*, reason]: Ger. *Misologie*; Fr. *misologie*; Ital. *misologia*. Hatred and despair of reason. Sometimes applied to intellectual PESSIMISM (q.v.). (J.M.B.)

Missing Link: the immediate ancestor of man. See ANTHROPOID, ad fin.

Mitosis [Gr. *μῖτος*, a thread]: Ger. *Mitose*; Fr. *mitose*; Ital. *mitosi*. The indirect mode of nuclear division, to which the term karyokinesis is also applied.

The chromatin of the nucleus forms a thread, which breaks up into a number of separate

CHROMOSOMES (q.v.); these become split each into two halves, which travel to the opposite poles of the achromatic spindle (amphaster), where they become reconstituted into the two daughter nuclei. Mitosis is the ordinary mode of nuclear division, and is found, with but little variation, in the cell division of the Protozoa and Metazoa, and of plants also. Cf. CELL THEORY (also for literature), AMITOSIS, and NUCLEUS. (E.S.G.)

Mixed [Lat. *mixtum*, from *miscere*, to mix]: Ger. *vermischt*; Fr. *composé*; Ital. *misto*. (1) Mixed proof: a proof which is partly analytic, partly synthetic.

(2) Mixed mode: a mode compounded of simple ideas of several kinds, put together to make one complex one (Locke, *Essay concerning Human Understanding*, Bk. II. chap. xii. § 5). See MODE.

(3) Mixed power: a power, at once active and passive, because the principle of change is in itself. (C.S.P.)

Mixture (linguistic): Ger. *Mischung*; Fr. *mélange*; Ital. *mescolanza*, *miscela*. Applied to the results of the borrowing from one language to another of words or other speech-elements.

Languages influence each other through individuals speaking two or more languages. Words of one language are fitted into the sentence framework of another. An inflectional or formative element cannot be 'borrowed,' i.e. become a loan-element, unless enough words containing it are borrowed to fix such element as an independent existence in the consciousness of the speech-community. In bilingual communities it is noticed that the tendency is for a single sentence-mould to suffice for two languages. This tendency to use a single mould of syntax with various vocabularies has brought about the 'modernizing' of the syntax of all European languages. (B.I.W.)

Mnemonic Verses and Words (in logic). Aids to memory in logic, of the sort described under MNEMONICS (q.v.). (J.M.B.)

1. *Instrumenta novem sunt, guttur, lingua, palatum*

Quattuor et dentes, et duo labra simul.

The following mnemonic verses are contained in the *Summulae Logicales* of Petrus Hispanus, but were older, perhaps very much older.

2. 'Quae?' ca. vel hyp., 'Qualis?' ne. vel aff., u. 'Quanta?' univ. par. in. velsing. [What is the substance of a proposition? categorical or hypothetical. What is its quality? negative

or affirmative. What is its quantity? universal, particular, indefinite, or singular.]

3. Simpliciter Feci, convertitur Eū per acci, Asto per contra: sic fit conversio tota. Asserit A, negat E, sed universaliter ambae; Asserit I, negat O, sed particulariter ambo.

[E and I are converted simply; E and A, per accidens; A and O, per contrapositionem.]

4. Prae, contradic.; post, contra.; prae postque, subalter. Non omnis, quidam non; omnis non, quasi nullus; Non nullus, quidam; sed 'nullus non' valet 'omnis'; Non aliquis, nullus; 'non quidam non' valet 'omnis'; Non alter, neuter; 'neuter non' praestat 'uterque'.

[Non placed before omnis or nullus gives the contradictory proposition; placed after, the contrary; both before and after, the subalter-nate.]

5. Primus, Amābimūs; Edentūli que, secundus; Tertius, Illiāce; Pūrpūrea, reliquus. Destruit ū totum, sed ā confirmat utrumque; Destruit ē dictum, destruit i que modum. Omne necessariat; impossibile, quasi nullus; Possibile, quidam; quidam non, possibile non. E dictum negat, i que modum, nihil ā, sed ū totum.

[The first syllable of each of the four vocables Amābimūs, Edentūli, Illiāce, Pūrpūrea, is for the possible mode; the second for the contingent; the third for the impossible; the fourth for the necessary. The vowel a signifies that both mode and 'dictum' are to be taken assertorically; e, that the dictum is to be denied; i, that the mode is to be denied; u, that both mode and dictum are to be denied. Each word refers to a line or order of equipollent modal forms.]

6. Tertius est quarto semper contrarius ordo. Sit tibi linea subcontraria prima secundae. Tertius est primo contradictorius ordo. Pugnat cum quarto contradicendū secundus. Prima subest quartae vice particularis habens se. Hanc habet ad seriem se lege secunda sequentem.

[The relation of 'Sortem impossibile est currere' and 'Sortem necesse est currere' is that of contraries; they cannot be true at once. The relation 'Sortem possibile est currere' and 'Sortem possibile est non currere' is that of subcontraries; they cannot be false at once. The relation of 'Sortem possibile est currere' and 'Sortem impossibile est currere' is that of contradictories. The relation of 'Sortem possibile est non currere' and 'Sortem necesse est currere' is likewise that of contradictories. 'Sortem possibile est currere' follows from 'Sortem necesse est currere,' as does 'Sortem possibile est non currere' from 'Sortem impossibile est currere.']

7. Sub. prae. prima, secundā prae. bis, tertia sub. bis.

[The first figure contains the middle term as subject and predicate; the second, the middle as predicated twice; the third, the middle twice as subject.]

8. Bārbārā, Cēlārēt, Dārī, Fērīō, Bārālipton, Cēlāntēs, Dābītīs, Fāpēsēmō, Frīsēsōmōrum, Cēsārē, Cāmēstrēs, Fēstīnō, Bārōkō, Dārāpti, Fēlāptōn, Dīsāmīs, Dātīsī, Bōkārđō, Fērison.

[These are original names of the syllogistic moods, which there is no sufficient reason for abandoning. The direct moods of the first figure are recognizable by their containing no sign of conversion, s, p, or k; the indirect moods (or moods of the fourth figure) by their having those signs attached either to the third vowel or to the first two. In the second figure, one of the signs s, p is attached to the first vowel, or to the second and third, or k is attached to the second. In the names of the moods of the third figure, s or p is attached to the second vowel, or to the first and third, or k to the first. There are also names for syllogisms with weakened conclusions or strengthened premises, as well as for indirect moods of the first figure considered as belonging to a fourth. But the above rules will enable a reader to identify them. Thus, Bramantip can be nothing but Baralip-ton; while Barbari is Barbara with a weakened conclusion. Camenes can be nothing but Celantes; Dimaris nothing but Dabitis; Fesapo nothing but Fapesmo; Fresison nothing but Frisesomorum. A writer who introduces an m into the name of a mood containing an s or p only after its third vowel, or who omits m from the name of a mood

having s or p after the first and second vowels, uses the fourth figure.]

9. Simpliciter vult s, verti p verō per acci. M vult transponi, k per impossibile duci.

Servat maiorem variatque secunda minorem;

Tertia maiorem variat servatque minorem. [s, in the name of a mood, shows that the proposition denoted by the preceding vowel is, in a preferred mode of reduction, to be converted simply; p, that it is to be converted per accidens; m shows that the premises are to be transposed; k, that the preferred reduction is by reduction of the contradictory of the conclusion to an absurdity, this contradictory of the conclusion being, in the second figure, put in place of the minor premise (the major being retained), and in the third figure in the place of the major (the minor being retained).]

A great number of other memorial words and verses have been proposed by logicians.

(C.S.P.)

Mnemonics [Gr. μνημονικός, pertaining to memory]: Ger. *Mnemonik*, *Gedächtniskunst*; Fr. *mnémotechnie*; Ital. *mnemonica*, *mnemotecnica*. Mnemonics or memoria technica is the art of memory, a code of rules for remembering. The method consists usually in a framework learned mechanically, of which the mind is supposed to remain in permanent and secure possession. Then, whatever is to be remembered is deliberately associated by some fanciful analogy or connection with some part of this framework, and this connection thenceforward helps its recall (James, *Princ. of Psychol.*, i. 668).

(E.B.T.)

Mob [abb. of Lat. *mobilis*, mobile]: Ger. *Pöbel*; Fr. *populace*, *foule*; Ital. *plebaglia*. See *Crowd*. A 'rabble,' the most disreputable sort of mob, is designated in Ger. by *Gesinde*, in Fr. by *canaille*, and in Ital. by *marzaglia*.

(J.M.B., E.M.)

Mobility [Lat. *mobilis*]: Ger. *Beweglichkeit*; Fr. *mobilité*; Ital. *mobilità*. That property of matter by virtue of which it may change its position in space unless impeded by other matter.

(S.N.)

Modalism (in theology) [Lat. *modus*, manner]: Ger. *Modalismus*; Fr. *modalisme*; Ital. *modalismo*. The doctrine that the divine nature is unitary in both substance and personality, and that Father, Son, and Holy Spirit represent simply three different modes of temporal manifestation. See *SABELLIANISM*.

(A.T.O.)

Modality [Lat. *modus*; see *MODE*]: Ger. *Modalität*; Fr. *modalité*; Ital. *modalità*. There is no agreement among logicians as to what modality consists in; but it is the logical qualification of a proposition or its copula, or the corresponding qualification of a fact or its form, in the ways expressed by the modes *possibile*, *impossibile*, *contingens*, *necessarium*.

Any qualification of a predication is a mode; and Hamilton says (*Lects. on Logic*, xiv) that 'all logicians' call any proposition affected by a mode a modal proposition. This, however, is going much too far; for not only has the term usually been restricted in practice, from the age of Abelard, when it first appeared, until now, to propositions qualified by the four modes 'possible,' 'impossible,' 'necessary,' and 'contingent,' with only occasional extension to any others, but positive testimonies to that effect might be cited in abundance.

The simplest account of modality is the scholastic, according to which the necessary (or impossible) proposition is a sort of universal proposition; the possible (or contingent, in the sense of not necessary) proposition, a sort of particular proposition. That is, to assert 'A must be true' is to assert not only that A is true, but that all propositions analogous to A are true; and to assert 'A may be true' is to assert only that some proposition analogous to A is true. If it be asked what is here meant by analogous propositions, the answer is—all those of a certain class which the conveniences of reasoning establish. Or we may say the propositions analogous to A are all those propositions which in some conceivable state of ignorance would be indistinguishable from A. Error is to be put out of the question; only ignorance is to be considered. This ignorance will consist in its subject being unable to reject certain potentially hypothetical states of the universe, each absolutely determinate in every respect, but all of which are, in fact, false. The aggregate of these unrejected falsities constitute the 'range of possibility,' or better, 'of ignorance.' Were there no ignorance, this aggregate would be reduced to zero. The state of knowledge supposed is, in necessary propositions, usually fictitious, in possible propositions more often the actual state of the speaker. The necessary proposition asserts that, in the assumed state of knowledge, there is no case in the whole range of ignorance in which the proposition is false. In this sense it may be said that an impossibility underlies

every necessity. The possible proposition asserts that there is a case in which it is true.

Various subtleties are encountered in the study of modality. Thus, when the thinker's own state of knowledge is the one whose range of ignorance is in question, the judgments 'A is true' and 'A must be true' are not logically equivalent, the latter asserting a fact which the former does not assert, although the fact of its assertion affords direct and conclusive evidence of its truth. The two are analogous to 'A is true' and 'A is true, and I say so'; which are readily shown not to be logically equivalent by denying each, when we get 'A is false' and 'If A is true, I do not say so.'

In the necessary particular proposition and the possible universal proposition there is sometimes a distinction between the 'composite' and 'divided' senses. 'Some S must be P,' taken in the composite sense, means that there is no case, in the whole range of ignorance, where some S or other is not P; but taken in the divided sense, it means that there is some S which same S remains P throughout the whole range of ignorance. So 'Whatever S there may be may be P,' taken in the composite sense, means that there is; in the range of ignorance, some hypothetic state of things (or it may be the unidentifiable true state, though this can hardly be the only such case) in which there either is no S, or every S there is is P; while in the divided sense, it means that there is no S at all in any hypothetic state but what in some hypothetic state or other is P. When there is any such distinction, the divided sense asserts more than the composite in necessary particular propositions, and less in possible universal. But in most cases the individuals do not remain identifiable throughout the range of possibility, when the distinction falls to the ground. It never applies to necessary universal propositions or to possible particular propositions.

Some logicians say that 'S may be P' is not a proposition at all, for it asserts nothing. But if it asserted nothing, no state of facts could falsify it, and consequently the denial of it would be absurd. Now let S be 'some self-contradictory proposition,' and let P be 'true.' Then the possible proposition is 'Some self-contradictory proposition may be true,' and its denial is 'No self-contradictory proposition can be true,' which can hardly be pronounced absurd. It is true that those logicians usually take the form 'S may be P'

in the copulative sense 'S may be P, and S may not be P,' but this only makes it assert more, not less. The possible proposition, then, is a proposition. It not only must be admitted among logical forms, if they are to be adequate to represent all the facts of logic, but it plays a particularly important part in the theory of science. See SCIENTIFIC METHOD. At the same time, according to the view of modality now under consideration, necessary and possible propositions are equipollent with certain assertory propositions; so that they do not differ from assertory propositions as universal and particular propositions differ from one another, but rather somewhat as hypothetical (i.e. conditional, copulative, and disjunctive), categorical, and relative propositions differ from one another—perhaps not quite so much.

According to this view, logically necessary and possible propositions relate to what might be known, without any knowledge whatever of the universe of discourse, but only with a perfectly distinct understanding of the meanings of words; geometrically necessary and possible propositions, to what a knowledge of the properties of space does or does not exclude; physical necessity, to what a knowledge of certain principles of physics does or does not exclude, &c. But when we say that of two collections one must be correspondentially greater than the other, but each cannot be correspondentially greater than the other, it has not been shown how this kind of necessity can be explained on the above principles.

The earliest theory of modality is Aristotle's, whose philosophy, indeed, consists mainly in a theory of modality. The student of Aristotle usually begins with the Categories; and the first thing that strikes him is the author's unconsciousness of any distinction between grammar and metaphysics, between modes of signifying and modes of being. When he comes to the *metaphysical* books, he finds that this is not so much an oversight as an assumed axiom; and that the whole philosophy regards the existing universe as a performance which has taken its rise from an antecedent ability. It is only in special cases that Aristotle distinguishes between a possibility and an ability, between a necessity and a constraint. In this, he is perhaps nearer the truth than the system of equipollencies set forth above.

Kant seems to have been the first to throw any light upon the subject. To the old dis-

inction between logical and real possibility and necessity, he applied two new pairs of terms, analytic and synthetic, and subjective and objective. The following definitions (where every word is studied) certainly advanced the subject greatly:—

1. Was mit den formalen Bedingungen der Erfahrung (der Anschauung und den Begriffen nach) übereinkommt, ist möglich.

2. Was mit den materialen Bedingungen der Erfahrung (der Empfindung) zusammenhängt, ist wirklich.

3. Dessen Zusammenhang mit dem Wirklichen nach allgemeinen Bedingungen der Erfahrung bestimmt ist, ist (existiert) notwendig (Krit. d. reinen Vernunft, 1st ed., 219).

Kant holds that all the general metaphysical conceptions applicable to experience are capable of being represented as in a diagram, by means of the image of time. Such diagrams he calls 'schemata.' The schema of the possible he makes to be the figure of anything at any instant. The schema of necessity is the figure of anything lasting through all time (ibid., 144, 145). He further states (ibid., 74, footnote; Jäsche's *Logik*, Einl. ix, and elsewhere) that the possible proposition is merely conceived but not judged, and is a work of the apprehension (Verstand); that the assertory proposition is judged, and is, so far, a work of the judgment; and that the necessary proposition is represented as determined by law, and is thus the work of the reason (Vernunft). He maintains that his deduction of the categories shows that, and how, the conceptions originally applicable to propositions can be extended to modes of being—constitutively, to being having reference to possible experience; regulatively, to being beyond the possibility of experience.

Hegel considers the syllogism to be the fundamental form of real being. He does not, however, undertake to work over, in the light of this idea, in any fundamental way, what is ordinarily called logic, but which, from his point of view, becomes merely subjective logic. He simply accepts Kant's table of functions of judgment, which is one of the most ill-considered performances in the whole history of philosophy. Consequently, what Hegel says upon this subject must not be considered as necessarily representing the legitimate outcome of his general position. His followers have been incompetent to do more. Rosenkranz (*Wissenschaft d. logischen Idee*) makes modality to represent the super-

seding of the form of the judgment and to be the preparation for that of the syllogism. In the *Encyclopädie*, Hegel's last statement, §§ 178–80, we are given to understand that the judgment of the Begriff has for its contents the totality (or, say, conformity to an ideal). In the first instance, the subject is singular, and the predicate is the reflection of the particular object upon the universal. That is, this or that object forced upon us by experience is judged to conform to something in the realm of ideas. But when this is doubted, since the subject does not, in itself, involve any such reference to the ideal world, we have the 'possible' judgment, or judgment of doubt. But when the subject is referred to its genus, we get the apodictic judgment. But Hegel had already developed the ideas of possibility and necessity in the objective logic as categories of Wesen. In the *Encyclopädie* the development is somewhat as follows: Wirklichkeit, is that whose mode of being consists in self-manifestation. As identity in general (the identity of Sein and Existenz) it is, in the first instance, possibility. That is to say, apparently, bare possibility, any fancy projected and regarded in the aspect of a fact. It is possible, for example, that the present Sultan may become the next Pope. But in the second movement arise the conceptions of the Zufällig, Aeusserlichkeit, and 'condition.' The Zufällig is that which is recognized as merely possible: 'A may be, but A may not be'; but it is also described by Hegel as that which has the Grund, or antecedent of its being, in something other than itself. The Aeusserlichkeit seems to be the having a being outside the ground of its being—an idea assimilated to caprice. That which such Aeusserlichkeit supposes outside of itself, as the antecedent of its being, is the presupposed condition. The third movement gives, in the first instance, 'real possibility.' In this we find the conceptions of 'fact' (Sache), 'activity' (Thätigkeit), and 'necessity.'

Lotze and Trendelenburg represent the first struggles of German thought to rise from Hegelianism. The most remarkable characteristic of Lotze's thought is, that he not only sees no urgency for unity of conception in philosophy, but holds that such unity would inevitably involve a falsity. He represents a judgment, as a means of apprehending becoming, in opposition to the concept, which apprehends being; but he says that the business of the judgment is to supply the

cement for building up concepts. Accordingly, he has no doctrine of modality as a whole, but merely considers three cases, between which he traces no relation. Necessity may arise either out of the universal analytic judgment, the conditional judgment, or the disjunctive judgment. By the 'judgment' is meant the meaning of a proposition. Lotze finds that the meaning of the analytical judgment is illogical, since it identifies contraries. However, the meaning of this meaning is justified by its not meaning to mean that the terms are identical, but only that the objects denoted by those terms are identical. The analytic proposition is, therefore, admissible, because it is practically meant to mean a particular proposition, that is, one in which the predicate is asserted of all the particulars. And the justification of the proposition, whose use was to be to connect elements of terms, is that, meant not as it is meant, but as it is meant to be meant, these elements are identical and do not need to be connected. In this way Lotze vindicates the necessity of the analytical categorical proposition. Coming next to conditionals, by thought of the same order, he finds that, assuming that the universe of real, intelligible objects is 'coherent,' we may be justified in asserting that the introduction of a condition *X* into a subject *S* gives rise to a predicate *P* as an analytical necessity; and for this purpose, when it is once accomplished, it does not matter whether the ladder of the assumption of coherence remains or is taken away. Lotze treats the disjunctive proposition last, as if it were of a higher order, following Hegel in this respect. But what was excusable for Hegel is less so for Lotze, since he himself had signalized the significance of impersonal propositions, such as 'it rains,' 'it thunders,' 'it lightens,' whose only subject is the universe. Now, if there is any difference between 'If it lightens, it thunders,' and 'Either it does not lighten or it thunders,' it is that the latter considers the actual state of things alone, and the former a whole range of other possibilities. However, Lotze considers last the propositional form '*S* is *P*₁ or *P*₂ or *P*₃.' Properly, this is not a disjunctive proposition, but only a proposition with a disjunctive predicate. Lotze considers it a peculiar form, because it cannot be represented by an Euler's diagram, which is simply a blunder. The necessity to which it gives rise must, therefore, either be the same as the conditional necessity, or else differ from it merely by greater simplicity. For

other sound objections to Lotze's theory see Lange, *Logische Studien*, ii.

Trendelenburg (*Logische Untersuch.*, xiii) maintains that possibility and necessity can only be defined in terms of the antecedent (Grund), though he might, perhaps, object to the translation of Grund by so purely formal a word as 'antecedent,' notwithstanding its harmony with Aristotle. If all conditions are recognized, and the fact is understood from its entire Grund, so that thought quite permeates being—a sort of phrase which Trendelenburg always seeks—there is 'necessity.' If, on the other hand, only some conditions are recognized, but what is wanting in Grund is made up in thought, there is 'possibility.' In itself, an egg is nothing but an egg, but for thought it may become a bird. Trendelenburg will, therefore, neither admit, with Kant, that modality is originally a mere question of the attitude of the mind, nor with Hegel, whom he criticizes acutely, that it is originally objective.

Sigwart, who holds that logical questions must ultimately be decided by immediate feeling, and that the usages of the German language are the best evidence of what that feeling is, denies that the possible proposition is a proposition at all, because it asserts nothing. He forgets that if a proposition asserts nothing, the denial of it must be absurd, since it must exclude every possibility. Now, the denial of 'I do not know but that *A* may be true' is 'I know *A* is not true,' which is hardly absurd. Sigwart, it is true, in accordance with usages of speech, takes '*A* may be true' in what the old logicians called the *sensus usualis*, that is, for the copulative proposition '*A* may be true, and further *A* may be not true.' But this does not make it assert less, but more, than the technical form. In regard to the necessary proposition, Sigwart, following his guide, the usages of speech, finds that '*A* must be true' asserts less than '*A* is true,' so that from the latter the former follows, but not at all the latter from the former. This may be true, for the usages of German speech, just as such phrases as 'beyond every shadow of doubt,' 'out of all question,' and the like, in our vernacular commonly betray the fact that there is somebody who not only doubts and questions, but flatly denies, the proposition to which they are attached. Bradley accepts the sensational discovery of Sigwart.

Lange (loc. cit.) thinks the matter is put in the clearest light by the logical diagrams

usually attributed to Euler, but really going back to Vives. 'We, therefore, here again see,' he says, 'how spatial intuition, just as in geometry, verifies (begründet) a priority and necessity.' (C.S.P.)

Mode [Lat. *modus*, manner]: Ger. *Modus*; Fr. *mode*; Ital. *modo*. In general, the manner of the existence of a thing. It is equivalent in the generic sense to the terms attribute, quality, state, all of which have substance as their correlative. But the term mode specially emphasizes the aspect of mutability or variability in things, that is, the change from one state to another. Although a substance, therefore, must exist in some mode, any individual mode is regarded as accidental. In consequence of this emphasis upon the aspect of variability, a differentiation arises between the term attribute, as signifying the permanent and essential qualities of a substance, and mode, as signifying its more variable qualities or the varying forms in which the fundamental attributes express themselves.

This is the sense of the term mode in the Cartesian system, where it first acquires philosophical prominence. 'We have understood by modes,' says Descartes (*Principia Philos.*, i. proposition 56), 'the same as what we elsewhere designate attributes or qualities. But when we consider substance as affected or varied by them, we use the term modes.' Besides God, to whom the term substance, in the sense of self-subsistent, is alone strictly applicable, there are for Descartes only two *summa genera* of things (or created substances), namely, minds or thinking things, and material or extended things. And of every substance, according to proposition 53, there is one principal property which constitutes its nature or essence, and upon which all the others depend. Thus extension constitutes the nature of corporeal substance, and is called *par excellence* its attribute, while the attribute of thought constitutes similarly the essence of thinking substance. For everything else that can be attributed to body presupposes extension, and is only some mode of an extended thing, as all the properties we discover in mind (such as imagination, sensation, or will) are only diverse modes of thinking. Modes are thus modifications of the one fundamental attribute of substance. This is the distinction of substance, attribute, and mode which furnishes the framework of Spinoza's system, in which the substantiality of the *res extensae* and the *res cogitantes* disappears, individual minds becoming modes of the divine attribute

of thought, and individual bodies modes of the divine attribute of extension.

Locke gave the term currency in English philosophy by his division of complex ideas into 'modes, substances, and relations.' Modes are 'such complex ideas which, however compounded, contain not in them the supposition of subsisting by themselves, but are considered as dependences on, or affections of, substances.' Locke apologises for using the word in a technical sense. Modes are then divided into simple and mixed. Simple modes are 'only variations or different combinations of the same simple idea, as a dozen or score, which are nothing but the ideas of so many distinct units added together.' Mixed modes contain 'a combination of several ideas of several kinds, e.g. beauty, theft' (*Essay II*, 12. 3-5). (A.S.P.F.)

Literature: EISLER, Wörterb. d. philos. Begriffe, 'Modus'; HÖFFDING, Hist. of Mod. Philos. (and other Histories), Index. (J.M.B.)

Mode (in logic) [Lat. *modus*, trans. of Gk. *τρόπος*]. See MODALITY.

Model [Lat. *modulus*, dim. of *modus*, measure]: Ger. *Modell*, *Vorschrift*; Fr. *modèle*; Ital. *modello*. (1) In psychology: something held up for conscious IMITATION (q. v.).

It is recommended that this term be in all cases employed for the matter set up for purposes of imitation (the usage of Taine, Tarde, Royce), the term COPY (q. v.) being used in the wider sense given it under that topic. The word 'example' is used in the four languages, especially with an ethical reference, for cases in which the model is explicitly chosen and pursued.

(2) In biology: see MIMICRY (4).

Literature: see IMITATION, and MIMICRY. (J.M.B., G.F.S.)

Moderation. Sometimes used to render the Greek *σωφροσύνη*. See TEMPERANCE. (J.M.B.)

Modesty [Lat. *modestus*, moderate]: Ger. (1) *Bescheidenheit*; Fr. (1) *modestie*; Ital. (1) *modestia*. (1) The form of timidity or shyness due to reflective self-consciousness.

(2) A popular term for general lowliness of mind.

The demarcation of modesty off from the other forms of SHYNESS (q. v.) is difficult, especially in view of the confusions of popular usage. There is often an element, both in the conscious state and in the physical reaction of modesty, due to the particular exciting object, which may, at the same time, excite SHAME or COYNES (see those terms); as, for example, when modesty is excited by physical indelicacy, which also produces shame.

Indeed, it is seldom that reflective emotion such as this is not complicated with special feelings and attitudes toward the object.

Literature: see SHYNESS. (J.M.B., G.F.S.)

Modification (in biology) [Lat. *modificatio*]: Ger. (*individuell erworben*) *Abänderung* (Wundt); Fr. *modification*; Ital. *modificazione*. A structural change wrought during the individual's lifetime (or acquired), in contradistinction from variation, which is of germinal origin (or congenital).

The term was used sometimes, but not consistently, in this sense by Darwin. In the Darwinian phrase 'descent with modifications' the ambiguity is evident as between what is congenital and what acquired.

The distinction indicated in the definition has been rendered necessary by the discussion as to the inheritance of acquired characters. Modifications are acquired by the individual; whether they can be transferred to the germinal substance and thus become hereditary as variations is the problem under discussion. See ACQUIRED CHARACTERS, and HEREDITY. Organisms capable of extensive modification are termed plastic; and this PLASTICITY (q.v.) may be subject to selection. The term ACCOMMODATION (q.v.) is reserved by some writers for the moulding of behaviour to environing circumstances on the part of organisms, referring to function rather than to structure. On the hypothesis of ORGANIC SELECTION (q.v.) modifications of structure may serve to foster COINCIDENT VARIATIONS (q.v.) of like nature, and accommodations of behaviour may thus set the direction of congenital variation, and so of evolution under the action of natural selection.

Literature: LLOYD MORGAN, *Habit and Instinct*; J. MARK BALDWIN, *A New Factor in Evolution*, Amer. Natural., June-July, 1896; HEADLEY, *The Problems of Evolution* (1901). (O.L.M.—J.M.B.)

Modification and Variation (mental). The same distinction between these terms is recommended as that given under MODIFICATION (in biology). Cf. VARIATION. (J.M.B.)

Modulus [Lat. *modus*, a mode]. (1) Proposed by Schröder (Ger. *Modul*; Fr. not in use; Ital. *modulo*, suggested—E.M.) for the four relative terms upon which the logic of dual RELATIVES (q.v.) hinges; namely, 'Not,' 'Same-as,' 'Excluded from a universe containing,' and 'With, or within a universe containing.'

These terms were first called by Peirce the 'definite dual relatives of second intention';

he now thinks it might be well to term these the four 'cardinals,' or four cardinal dual relatives.

Literature: PEIRCE, in *Studies in Logic* by Members of the Johns Hopkins University, 191, and Amer. J. Math., iii. 47; SCHRÖDER, *Algebra d. Logik*, iii. 117.

(2) See ERRORS OF OBSERVATION. (C.S.P.)

Modus ponens and **Modus tollens** [Lat.]

Two ways of reasoning from a conditional proposition or consequence. The *modus ponens* from the consequence and the antecedent infers the consequent; the *modus tollens* from the consequence and the falsity of the consequent infers the falsity of the antecedent, thus:

Modus Ponens. *Modus Tollens.*

If *A* is true, *C* is true; If *A* is true, *C* is true;

A is true; *C* is false;

∴ *C* is true. ∴ *A* is false.

A third way of reasoning, namely, from the truth of the antecedent and falsity of the consequent, to the falsity of the consequence, is generally overlooked. See HYPOTHETICAL (syllogism). (C.S.P.)

Mohammed, or **Mahomet**, or **Mahoméd**, or **Muhammed**. (cir. 570–632 A.D.) An Arabian prophet, born at Mecca. His father died about the time of Mohammed's birth, and his mother in his sixth year. He was raised by a grandfather and an uncle.

The latter, Abu Talib, was his faithful friend and protector all through life. Accounts of Mohammed's youth are legendary: he probably tended flocks until his twenty-fifth year, when he entered the service of a rich widow named Chadidja, whom he married. In his fortieth year Mohammed saw his first 'vision' and received his 'message.' In four years he made forty proselytes, and it was revealed to him that he must preach openly. As his followers increased in numbers, he was forced to the most careful watchfulness to save his life. About 622 he moved to the friendly city of Medina, and the Mohammedan era dates from the first month of the following Arabic year. Mohammed now became the law-giver, judge, and ruler of Medina and of two powerful Arabian tribes. In the first year of the new era, he assumed hostilities against his enemies. War followed, and in the sixth year of the new era the first pilgrimage to Mecca was announced, but not carried out until the following year. The Meccans concluded peace with him, however, and he had become an equal power. His missionaries passed throughout Arabia, and even beyond its borders. Mohammed's forces being de-

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