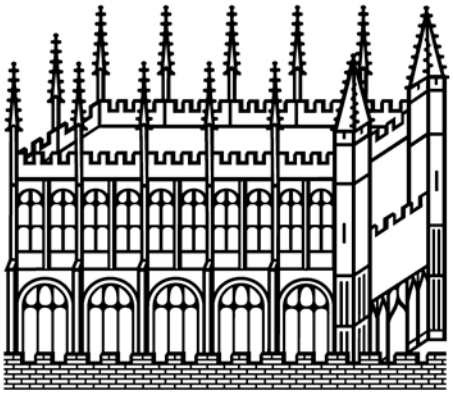

Anne Williams's BOOK.

Sister of Dr. John Cooke [redacted] President of C.C.C.
eldest Daughter of Prebendary Cooke of Winchester

THE YOUNG MATHEMATICIAN'S

Wife of Rev John Williams, Vicar of Catherington.

LOGIC,

Upon the Plan of

Dean ALDRICH's

CELEBRATED

ARISTOTELIC LOGIC,

AND

Serving to explain the ſame.

To which is annexed,

Critical Remarks upon Grammar in general.

By the Author of *Education of Children and young Students in all its Branches.*

Quæ convenêre fatetur tranſtuliſſe, atque uſum pro ſuis.

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by Rev^d J^n Williams
Vicar of
Catherington

ERRATA.

P. 9. l. 20. put a full Stop after "*together*," and inſert "*The Verb.*"

P. 22. l. 27. after "*Græcos*," inſert "*honore.*"

P. 30. laſt l. read "*by putting.*"

THE YOUNG MATHEMATICIAN'S

LOGIC.

AN Art is the way of doing a thing readily, ſurely, and gracefully.

Logic is the art of reaſoning.

The operations of the mind are three.

1. Simple apprehenſion.
2. Judgment.
3. Reaſoning.

1. Simple Apprehenſion * is the bare conception of a thing by the underſtanding.

* *Malebranche* conſiders all the operations of the mind as meer perceptions. 1. of Ideas; 2. of an immediate relation between two Ideas; 3. of the relation between two Ideas and a third, and thereby of their relation to each other.

The ſame evidence is not to be expected in all things. *Ariſtotle*'s ethics to *Nicomachus*. Book I.

Different things muſt have different kinds of proof; one ſort in mathematics, another in the properties of bodies, another in doubtful matters, and another in matters of fact. And we are to abide by that, whoſe teſtimonies are void of all ſuſpicion:

The immediate object of the underſtanding is called an idea ; as *a tree*, *a triangle*, *a man*, *a thought*, *a ſpirit*.

All ideas are preſented to the mind either by the ſenſes, or by the meditation of the mind. The former are called ideas of ſenſation ; the latter ideas of reflection. *See Locke on human underſtanding*.

2. Judgment is a diſcerning of an agreement, or diſagreement between two ideas ; and it is either *affirmative*, as *the earth is round* ; or *negative*, as *the ſun is not a planet*.

3. Reaſoning, or diſcourſe finds out, or ſhews, that two ideas agree or diſagree by comparing each of them with a third.

Thus, B=A	Here B is a common meaſure, which ſhews that C=A
C=B	
∴ C=A	

We form general ideas, or pictures of ſeveral things in the mind, by *abſtraction* †, that is, *firſt*, by omitting the modes and relations of particular things ; or *ſecondly*, by conſidering a mode without its ſubject.

There

picion : which if it be not admitted, not only all hiſtory is of no uſe, and a great part of phyſic ; but all that natural affection, which is between parents and children, is loſt, who can be known no other way. *Grotius* of the truth, &c. Book II. §. 19.

Mathematical certainty is not to be met with in all things. *Ariſtotle*'s metaphyſics.

† See *Locke* on abſtraction, and on real and nominal eſſence.

There are five ſorts of general words called *predicables*, which expreſs five ſorts of general ideas.

1. *A genus*, which is predicated of ſeveral things, as the common part of their eſſence; as an *animal*.

2. *Difference*, which is predicated of them as their diſtinguiſhing part; as *rational*.

3. *Species*, as their whole eſſence; as a *man*.

4. *Property*, as neceſſarily joined to their eſſence; as *riſible*.

5. *Accident*, as joined contingently to their eſſence; as *white*, *black*, &c.

As a general word contains many particulars under it, he that reckons up its various ſignifications is ſaid to divide it. Thus he that ſays the word *animal* ſignifies both *man* and *brute*, is ſaid to divide *animal* into *man* and *brute*.

Wherefore *diviſion* is a diſtinct enumeration of ſeveral things which are ſignified by a common name.

The common name is called a *divided whole*; and its diſtinct ſignifications are called the *dividing parts or members*.

There are three rules of a good diviſion.

1. That the dividing members ſingly contain leſs (that is, have a leſs extenſive meaning) than the thing divided. For the whole is greater than any of its parts.

2. The

2. The dividing members taken together ſhould contain neither more nor leſs than the thing divided. For the whole is equal to all its parts.

3. That the members of the diviſion be oppoſite, ſo that one member may not be affirmed of another; for it is in vain to divide where there is no diſtinction; or to diſtinguiſh where there is no difference.

Examples. *Number* is properly divided into equal and unequal. *Extenſion* (geometrically conſidered) is divided into a *line*, *ſurface*, and *ſolid*; for though the *line* be included in the *ſurface*, and the *ſurface* in the *ſolid*, yet the *ſurface* cannot be called the *ſolid*, nor the *line* the *ſurface*, becauſe we have diſtinct ideas of them.

A *definition* explains the thing defined by taking ſomething that is *common* to it with other things, (that is, the *genus*,) and ſomething that is *peculiar* to it, (that is, the *difference*, which diſtinguiſhes it from all other things.) As, *arithmetic* is the art of numbering, *algebra* is the art of computing by ſymbols. Hence it is plain, that definition has only to do with compound ideas, for it is an enumeration of the ſeveral ſimple ideas of which a compound idea conſiſts.

There are three rules of a good definition.

1. That it be adequate to the thing defined; that is, contain neither more nor leſs.

2. That

2. That it be proper to the thing defined, or diſtinguiſh it from all others.

3. That it be more clear and eaſy than the thing defined.

N. B. Here we only treat of the definition of the thing.

The definition of the name only explains the meaning of a word.

The two ordinary defects of a definition is to agree neither to the *whole* thing, nor to the *ſole* thing.

It may not be amiſs, (though not abſolutely neceſſary,) in this place, to take notice, that a *rhetorical definition*, according to *Tully*, is a ſhort and perfect commprehenſion of the peculiar properties of a thing; but that is rather a *deſcription* than an accurate *definition.*

The definitions of the orator differ much from thoſe of the logician and philoſopher. Theſe latter define a thing cloſely by *genus* and *difference.* For inſtance, "*Man is a rational animal.*"

The former takes a larger compaſs, and defines things ornamentally: thus, "Man is a curious work of an almighty creator, framed after his own image, endued with reaſon, and born for immortality."

What follows may poſſibly be admitted into this claſs. "What a piece of work is man! how noble in reaſon, how infinite in faculties! in form and moving how expreſs and

and admirable! in action how like an angel! in apprehenſion the beauty of the world, the paragon of animals!" *Shakeſpeare's Hamlet.*

There are divers ſorts of rhetorical definitions; as, *firſt*, that drawn from the parts, whereof a thing conſiſts: thus, "Oratory is an art conſiſting of invention, diſpoſition, elocution, and pronunciation." *Secondly*, from the effects; as, ſin is the plague of the ſoul, the ſcandal of nature, the ruin of the world, and the hatred of God, &c. *Thirdly*, from negation and affirmation, as when we firſt ſay what a thing is not, that it may better be conceived what it is. Thus, *Tully*, by ſhewing that the *conſulate* does not conſiſt in enſigns, &c. but in *virtue*, and particularly in *conſulting the good* of the republic, proves that *Piſo* was not a *conſul*. *Fourthly*, from the adjuncts, as when *alchymy* is defined, "An art without ſenſe, whoſe beginning is deceit; middle labour; and end beggary." *Laſtly*, from metaphors and ſimiles; as when death is defined, "A leap in the dark," &c.

To this laſt claſs [of metaphorical definitions] are reducible thoſe not inelegant definitions of *man*, which follow.

The poets feign that the ſciences were once called together by *Minerva*'s command, to form a definition of *man*. *Logic* defined him, "A ſhort *Enthymeme*; his birth the antecedent, and his death the conſequent." *Aſtronomy* defined him, "A changeable moon, which

which never continues in the ſame ſtate." *Geometry* defined him, "A ſpherical figure, which ends in the ſame point where it begun." *Laſtly*, *rhetoric* defined him, "An oration, whoſe exordium was to be born; narration, trouble; and peroration, death; the figures of the oration being ſighs and tears, or mirth and joy."

Of a Propoſition.

A Propoſition is a judgment expreſſed in words; or a ſentence which affirms or denies.

Every propoſition contains

1. A ſubject. 2. A copula. 3. A predicate.

The *ſubject* is that concerning which ſomething is ſaid.

The *predicate* is that which is ſaid.

The *copula*, or connective word, comes in the middle between theſe two, and joins them together [*is*] is a *copula*. There is no pure logical verb beſides [*is*] the reſt are compounded of *is* and a participle; as, *loves* ſignifies *is loving*.

The ſubject and predicate are the extremes, and are called the *terms* of a propoſition, which, in regard to the ſenſe, they terminate on each ſide.

The diviſions of a propoſition are various.

1. That is a *categorical* propoſition, which declares ſomething abſolutely. As, *the three angles of every plain triangle are equal to two right angles.*

2. That is a *hypothetical* propoſition, which declares ſomething conditionally. As, *if two right lines interſect each other, the oppoſite angles will be equal.*

Again, that is an *affirmative* propoſition whoſe copula affirms. As, *the longeſt ſide of every plain triangle ſubtends the greateſt angle.*

Negative, whoſe copula denies. As, *two right lines do not include a ſpace.* Further,

1. A propoſition is *univerſal*, whoſe ſubject is univerſal, or taken in the whole extent of its meaning, without excepting any thing contained under it. This univerſality is expreſſed by the word *all* or *every*, when the propoſition is affirmative, and by the word *none* or *no*, when it is negative; as, *every equilateral triangle is equiangular. No ſquare is equal to a circle that circumſcribes it.*

N. B. We with certainty form univerſal propoſitions concerning *modes* whoſe entire eſſence is known to us. Hence it is that *geometry*, which is wholly converſant about modes, is built on the moſt certain foundation.

Propoſitions are ſaid to be *tranſpoſed*, when having the ſame ſubjects and predicates they differ in regard to affirmation or negation, univerſality or particularity, or both. Contradictory

tradictory oppoſition (the only one regarded in mathematics) is between two categorical propoſitions, whereof one is a univerſal affirmative, the other a particular negative; or the one a univerſal negative, and the other a particular affirmative.

Contradictory propoſitions are neither both true, nor both falſe.

A propoſition is ſaid to be *converted*, whoſe extremes are tranſpoſed.

Simple converſion (the only one uſed in mathematics) is when nothing is changed beſides the order of the extremes. As,

A=B, whoſe converſe is
B=A.

And, No A=B. No B=A.

Reaſoning contains argumentation and method.

Of a pure categorical Syllogiſm.

A Syllogiſm is reaſoning expreſſed in words. As,

A=C. The major propoſition.
A=B. The minor propoſition.

∴ B=C. The concluſion.

The two firſt propoſitions are called premiſes, poſitions, and the antecedent; the

third is called the concluſion, ſequel, and conſequent.

N. B. If you ſubſtract one of the premiſes from the other algebraically, the remainder will be the concluſion: for which reaſon theſe words, "it remains therefore," may properly be prefixed before concluſions.

Syllogiſm is founded on the following Axioms.

1. Two things that agree with one and the ſame third, agree with each other.

2. Two things, whereof one agrees with, and the other differs from, one and the ſame third, differ among themſelves.

This third idea is a common meaſure to find out the relation between two ideas, which we perceive are ſo and ſo related to it.

The conſequent before it is proved, is called a *problem*, or *queſtion*; but in a ſyllogiſm, or after it is proved, it is called a concluſion. The predicate of the queſtion is called the *major* term; the ſubject is called the *minor* term; and the third term is called the *medium*; becauſe it has often a greater extent of meaning than the ſubject, and leſs than the predicate.

In regard to the premiſes of a ſyllogiſm, that is the major propoſition, in which the medium is compared with the predicate of the concluſion, or major term; and that the minor propoſition, in which the medium is

compared

compared with the ſubject (or minor term) of the concluſion.

A figure (in logic) is a regular diſpoſition of the medium with the parts of the queſtion.

There are four ways of comparing the medium with the parts of the queſtion.

1. It may be ſubject to the major and predicate to the minor, which is the firſt figure.

2. Subject to *both*, which is the ſecond figure.

3. Predicate to *both*, which is the third figure.

4. Predicate to the major, and ſubject to the minor, which is the fourth figure.

1.	2.	3.	4.
B=A	A=B	B=A	A=B
C=B	C=B	B=C	B=C
∴ C=A	∴ C=A	∴ C=A	∴ C=A

The modern mathematicians often place the medium and the two terms together, which they call a *juxta-poſition*: thus, A=B=C. Here the medium is in the middle between the two terms.

Negative and particular concluſions are ſeldom uſed in Mathematics, and therefore the forms above, together with proper *ſubſtitutions*, and what is called *reductio ad abſurdum*,

dum *, are ſufficient for reaſoning mathematically.

Reduction to an abſurdity, or to an impoſſibility, is when your oppoſer grants your premiſes, but denies your concluſion. In this caſe, you take the contradictory of your concluſion with one of the premiſes; and, from thoſe two propoſitions, infer the contradictory of the other premiſe; which is contradicting a known truth granted by your oppoſer. Now as this new concluſion neceſſarily follows from your new premiſes, your oppoſer muſt either grant your firſt concluſion, or contradict a truth granted by himſelf: for as your two concluſions are contradictory to each other, they can neither be both true, nor both falſe; and truth never leads to abſurdities.

An Example.

Every A=B
Every B=C
∴ Every C=A

If the premiſes be granted, but the concluſion denied, take the contradictory of the concluſion, thus,

No

* This is alſo called, argumentum ab abſurdo. By urging your adverſary with an abſurdity, you oblige him to diſown the error from which the abſurdity follows. See Biſhop *Hoadly*'s letter to *Atterbury*.

No C=A
Every A=B
∴ No C=B.

Which contradicts the ſecond premiſe, whoſe truth was granted; for if No C=B it follows *é converſo* that no B=C, which is the contradictory of the ſaid ſecond premiſe.

1. An *enthymeme* is an imperfect ſyllogiſm, wherein one of the premiſes is ſuppreſſed, being eaſily ſupplied by the underſtanding. e. g. *Man* is an animal, therefore man is a living creature.

The propoſition underſtood in the mind, and not expreſſed in the above enthymeme, is this; *viz. an animal is a living creature.*

2. *Induction* is a method of reaſoning very much uſed in experimental philoſophy. It lays down ſuch and ſuch things as true of many individuals, and aſſumes the ſame as true of *all* individuals of the ſame ſort. Thus having diſcovered that a great many pieces of iron are attracted by the load-ſtone, I conclude that all iron is ſo attracted.

3. *Example*, or argumentation by analogy, is, when what is aſſerted concerning a particular known thing, is aſſumed of the *like* unknown thing: as *Marius ruined his country*, therefore *Julius Cæſar will ruin it.*

4. A *ſorites*, or gradation, is a ſort of argumentation in which as many ſyllogiſms are underſtood as there are intermediate propoſitions

tions in it. The merry way uſed by *Themiſtocles* to prove that his little ſon under ten years of age, commanded the whole world, is a *ſorites*. " My ſon commands his mother; his mother me; I command the *Athenians*; the *Athenians* the *Greeks*; the *Greeks Europe*; *Europe* the whole world: therefore my ſon commands the whole world."

A hypothetical ſyllogiſm is twofold; *conditional*, and *disjunctive*.

Firſt, Conditional.

If the moon always ſhews the ſame face to the earth, it turns round its axis but once during its whole revolution; but the moon always ſhews the ſame face to the earth; therefore it turns round its axis but once during its whole revolution.

There are only two forms of a conditional ſyllogiſm.

1. That which is called *conſtructive*.

If C=D, then K=T,
But C=D;
∴ K=T.

2. That which is called *deſtructive*.

If C=D, then K=T,
But C is not =D;
∴ K is not =T.

Secondly, Disjunctive.

Thus if you lay down this poſition; *viz.*

Either

Either it is C, or D. (you may proceed)
But it is C, ∴ not D.
But it is D, ∴ not C.
But it is not C, ∴ D.
But it is not D, ∴ C.

Which poſition, or disjunctive propoſition, may be eaſily expreſſed conditionally, thus,

If C, then not D.
If D, then not C.
If not C, then D.
If not D, then C.

There are two ſorts of demonſtration.

The *firſt* proves that a thing is ſo, either by a *direct demonſtration*, or elſe by ſhewing that if *it is not ſo*, ſome abſurdity neceſſarily follows, this is called *reductio ad abſurdum*, and ſometimes oblique demonſtration.

The *ſecond* ſort of demonſtration, ſhews why a thing is ſo, by aſſigning the very *immediate* cauſe.

Demonſtration begets *knowledge*, and probable arguments * *opinion*.

All reaſoning is in ſome method or other, and I ſhall now treat of the method uſed in reaſoning mathematically.

Method is twofold; one of *reſolution*, by which truth is ſought after; the other of *compoſition*, by which truth, now found out, is taught to another.

* Argumentum eſt ratio quæ rei dubiæ facit fidem.
Cic. Top. 2.

Geometry ſupplies the moſt perfect examples of the *ſynthetical method*, or method of compoſition; and algebra ſupplies the moſt perfect examples of the *analytical method*, or method of reſolution. For the former conſult *Euclid*, for the latter *Newton* and *Maclaurin*; *Sanderſon* and *Simpſon*.

The method of compoſition proceeds from known quantities to unknown.

The method of reſolution proceeds in a retrograde order, from unknown quantities taken as known, to known quantities taken as unknown.

If you trace a quantity from its *known* property, (for you can reaſon only from what you know,) the method is analytical; but if you trace a property from the quantity, the method is ſynthetical; and a mathematical demonſtration of either ſort, proves or ſhews by a diagram, the connection between any quantity and the property aſcribed to it.

1. An example of the analytical method, in a problem propoſed indefinitely.

What two numbers are thoſe, whoſe ſum is a and difference b?

Subſtitute	1	x for the leſſer number,
then	2	$x+b$=the greater. By the two conditions of the problem, whereof the *laſt* forms the equation.
1+2	3	$2x+b=a$
$3-\overline{b}$	4	$2x=a-b$
$4\div\overline{2}$	5	$x=\frac{a-b}{2}$
Whence	6	$x+b=\frac{a-b}{2}+\frac{b}{1}=\frac{a-b+2b}{2}=\frac{a+b}{2}$ The greater number.

2. A

2. A ſynthetical demonſtration of the foregoing theorem.

The ſum of the numbers. $\frac{a+b}{2}+\frac{a-b}{2}=\frac{2a}{2}=a$. Which anſwers the firſt condition of the problem. The difference of the numbers. $\frac{a+b}{2}-\frac{a-b}{2}=\frac{2b}{2}=b$. Which anſwers the ſecond condition.

3. Hence it is evident, *firſt*, that the *analytical* demonſtration places you in the condition of the inventor, for it inveſtigates an unknown quantity by its known properties. *Secondly*, that the *ſynthetical* demonſtration ſhews that a known quantity has ſuch and ſuch properties, and uſes fewer principles than the analytical; the above-given ſynthetical demonſtration being performed by addition and ſubſtraction.

In regard to geometrical demonſtrations conſult *Euclid*, where the knowledge you gain is clearer than in algebra, as being more intuitive; for the figures are real reſemblances, or pictures, but letters are meer arbitrary (though more general) repreſentations, of what they are uſed to ſignify.

The general rules of method are theſe.

That in treating of any ſubject, 1. There be nothing either wanting or ſuperfluous. 2. That the parts agree. 3. That there be nothing foreign to the ſubject. 4. That the parts be connected by apt tranſitions. 5. That

ſhould precede in teaching which is neceſſary towards the underſtanding of another.

The mathematicians in their writings uſe this method.

1. They define their terms, and uſe them always in the ſame ſenſe.

2. To their definitions they join axioms or ſelf-evident truths, which they ſee will be uſeful in the courſe of their work.

3. Afterwards they add poſtulates, which relate to practice. Theſe are alſo ſelf-evident, and therefore they may require them to be granted without proof.

4. In the next place they demonſtrate propoſitions, as much as they can affirmatively; and make it an invariable rule to prove every thing from what was already granted, or demonſtrated.

It may not be improper to obſerve, that geometry is the beſt logic. For it teaches us to reaſon by the beſt examples, and while it employs the underſtanding in demonſtrating the properties of certain inviſible quantities, it at the ſame time repreſents thoſe quantities viſibly to the imagination, which it thereby confirms; the attention is here improved by means of the ſenſes, the mind being more intent on the thing it contemplates, while the eyes are fixed on the figures that repreſent it. Th[illegible] capacity is here enlarged by cloſe thinking, a[illegible] conſidering many ideas in a ſhort time. Here evidence (the ſole criterion of truth)

truth) compels our aſſent. Here is no danger of confounding the figure with the thing repreſented, nor of acquieſcing in obſcure ideas, as if they were clear, which is the ſource of all our errors.

A *dilemma* is a redundant hypothetical ſyllogiſm conſiſting of two contrary parts, either of which catches the adverſary. This method of reaſoning is often uſed in geometry.

For a dilemma to be legitimate, two things are required. 1. A full enumeration of parts. 2. That the dilemma preſs the adverſary alone, and that the perſon, who makes it, be not liable to have it retorted upon him.

Tully uſes this fine dilemma, to prove that all pain is to be bore with patience. All pain is either violent or light; if light, it will be eaſily bore, if violent, it cannot be laſting.

N. B. 1. A proof *a poſteriori*, is that whereby a concluſion is proved by ſomething poſterior.

2. A proof *a priori*, is that whereby a concluſion is proved by ſomething previous.

3. A proof *a fortiori*, is that whereby a concluſion is proved by a *ſtronger* argument, (by ſuppoſing or granting more) than was neceſſary; that the truth may appear the more undeniable. Thus, if there is no profit in gaining *this whole world* by loſing one's ſelf, there is certainly no profit in what ſinners do really gain by incurring the ſame loſs.

In

In order to encourage the ſtudy of *Euclid*'s elements, the true practical logic, I ſhall obſerve that *Plato* makes uſe of this beautiful expreſſion, " *God always geometrizes.*" And the ingenious *Tacquet* addreſſes himſelf thus to his Maker, " *How great a geometrician art thou O God !* "

I ſhall conclude in the words of Biſhop *Berkley* *, " Geometry is an excellent logic, " for when the definitions are clear, when " the poſtulata cannot be refuſed, nor the " axioms denied ; when from the diſtinct " contemplation and compariſon of figures, " their properties are derived by a perpetual " well-connected chain of conſequences, the " objects being ſtill kept in view, and the " attention ever fixed upon them ; there is " acquired a habit of reaſoning, cloſe, and " exact, and methodical : which habit " ſtrengthens and ſharpens the mind, and " being transferred to other ſubjects, is of " general uſe in the inquiry after truth."

Note. It appears from *Cicero* that the *Romans*, though they did not apply mathematics to ſo many purpoſes as the *Greecians* did, yet learnt geometry in order to reaſon well. " In ſummo apud illos [i. e. Græcos] Geometria fuit.—At nos metiendi ratiocinandique utilitate inſpecta, hujus artis terminavimus modum." *Tuſc.* L. 1.

* Fas eſt et ab hoſte doceri. Non quis ſed quid.

POST-

All the works of God are in number, weight, and measure, and therefore objects of Arithmetic, Mechanics, and Geometry, the three principal Mathematics.

POSTSCRIPT.

THOSE that have no taſte for the mathematics, may, notwithſtanding, learn to reaſon well by example; by reading and imitating our beſt reaſoners; namely, *Chillingworth*, *Locke*, *Woollaſton*, and Biſhop *Hoadly*.

CRITICAL

CRITICAL REMARKS

UPON

GRAMMAR in general.

GRAMMAR is the art of ſpeaking and writing.

To ſpeak is to explain our thoughts by articulate ſounds, which are the objects of hearing: but ſounds being tranſient, men have invented permanent ſigns; thoſe are the characters in writing, which are objects of ſight, and convey the thoughts of the moſt diſtant inhabitants of the earth to each other. It is generally believed that the *Phenicians*, or *Edomites* *, firſt invented writing.

Phœnices primi (famæ ſi creditur) auſi
Manſuram rudibus vocem ſignare figuris.
Lucan.

Pictures

* See Sir *Iſaac Newton*'s chronology.

Pictures are natural reſemblances of things; but *letters* are arbitrary and general repreſentations of ideas; which ideas are ſubſtituted for things. It was a moſt wonderful invention to paint the voice, and to ſpeak to the eyes, which is done in the moſt laſting manner by the uſe of letters.

Varro divides grammar, very philoſophically, into orthography, proſody, analogy, and ſyntax.

A word is an articulate ſound, which men, by conſent, have made the ſign of ſome thought.

As words are invented to expreſs our thoughts, we cannot perfectly diſcover the different ſorts and ſignifications of words, without firſt conſidering what paſſes in our minds.

The operations of the mind are three. Simple apprehenſion, judgment, reaſoning.

As the third operation of the mind is only an extenſion of the *ſecond*, and as the ſecond contains the *firſt*, it will be ſufficient for our preſent purpoſe to conſider the *ſecond* only; *viz.* judgment.

The effect of a judgment is a propoſition, and a propoſition naturally includes two *terms*, one called the *ſubject*, or that of which ſomething is ſaid, as, *the earth*, and the other called the *predicate*, or that, which is ſaid of the ſubject, as, *round*, and then *is* which *affirms*, and connects the two terms together.

There is no pure, or unmixed, logical verb, excepting *is*, which in propoſitions eternally true, implies only the ſimple ſignification, without any relation to diverſity of perſons, or even to time. As, *God is infinite. Body is diviſible ad infinitum.*

Firſt, The two *terms* belong to the *firſt* operation of the mind, becauſe they ſignify the objects of our thoughts, or what we conceive. *Secondly*, The connection belongs to the *ſecond*, and may be called the action of the mind.

We refer to judgment the *conjunctions*, *diſjunctions*, and other the like operations of the mind, as well as all the other motions of the ſoul, as deſires, commands, interrogations, &c.

The words of the firſt claſs, or which expreſs ſimple apprehenſion, are, 1. *Names*, under which are comprehended perſonal names, or pronouns ſubſtantive. 2. Qualities, under which are comprehended participles, and pronouns adjective, or perſonal qualities. 3. Prepoſitions, or *fore-placed words*. 4. Adverbs, or added words.

Thoſe of the ſecond claſs, or which expreſs judgment, are, 1. *Verbs*, or *words of affirmation*. 2. *Conjunctions*, or *joining words*.

N. B. The *interjection* needs not to be diſtinguiſhed into a peculiar part of ſpeech, becauſe it is only an *added word of paſſion*, and is accordingly by the Greek grammarians ranked

ranked under the *adverb*. It expreſſes both ſimple apprehenſion and judgment, becauſe it is a ſentence in one word.

According to theſe obſervations ſome modern philoſophers divide the parts of ſpeech into *four*; and they ſubdivide the fourth part into *three* more parts; as follows.

1. A ſubſtantive, or the name of any thing, which may be made a ſubject of diſcourſe, as, *a houſe*, *circle*, *goodneſs*.

2. An adjective, or *adname*, which ſignifies what ſort of a thing you talk of. As, *high*, *good*, *bad*, &c.

N. B. They who under the word *noun* comprehend both the ſubſtantive and adjective, ſhould define it thus. A noun is either the name of a thing, or of a quality belonging to a thing. As, *a tree*, *high*. The former is a ſubſtantive, the latter an adjective *.

The articles *the*, *a*, *an*, may be ranked under the adjective.

3. A verb, or a word which affirms; as to be, to love, to be loved, to rejoice, to ſtand.

Note. The chief uſe of the *verb*, is to ſignify the *affirmation*, but yet it ſignifies other motions of the ſoul, as *to deſire*, *to pray*, *to commend*, &c. but it is only by changing the inflection, or the *mode*, or *manner*, commonly

 called

* The uſe of the pronouns is to prevent a diſagreeable repetition of the ſame word.

called *mood*. It is by the verb ſubſtantive, *viz. to be*, we mark the connection between the terms of a propoſition.

Men, in order to ſhorten their expreſſions, have alſo invented the verb adjective, wherein the predicate is joined to the affirmation, as, *Peter lives*, that is, *Peter is living*: and ſometimes the ſubject, as *vivo* (I am living) is an intire propoſition, for it includes the perſonal name *ego*, which is the ſubject of the propoſition, *ſum*, the affirmation, and *vivens*, the predicate. Vivo, *i. e.* Ego ſum vivens.

To the verb is alſo joined a relation to the *time* with reſpect to the thing affirmed.

4. Particles, or little words, which, are of three ſorts.

1. *Adverbs*, or *added words*, which ſignify the circumſtance or manner of words by being joined to them. As, *wiſely*, that is, with wiſdom. The adverb, when joined to a *verb*, explains *how*, *when*, *where*, *whether*, or *no*, one is, does, or ſuffers. It is ſometimes joined to an adjective, as, *very* happy; and ſometimes to itſelf; as, *very* comfortably.

All adverbs may be reduced to two claſſes, that is, adverbs of quantity, as, *moſtly*; and adverbs of quality, as, *well*.

2 A conjunction, or joining word, joins ſentences together, as, *and*, *alſo*, *nor*, *neither*, &c.

Theſe,

Theſe, like ſmall joints, connect the ſeveral ſentences, but cannot be exhibited by any images.

3. Prepoſitions, or fore-placed words, which ſhew the relation of things or words to each other; as, *John* goes *over Highgate-hill*; or, prepoſitions may be defined, words which ſignify reſt in a place, or motion to, from, or about a thing.

N. B. As to interjections, it was obſerved that they are ranked under the adverb, being only added words of paſſion, for they expreſs the emotions of our ſouls, as *alas! oh!* &c. One of theſe makes a ſort of ſentence.

Some prepoſitions only compound a word; as, *un-*, *fore-*, *miſ-*, *be*, &c. in engliſh.

2. *N. B.* The uſe of caſes and of prepoſitions is the ſame; that is, to ſhew the relation that things have to one another.

3. *N. B.* Adverbs were invented to ſhorten diſcourſe, for the greateſt part of them are only to ſignify in one word what could not elſe be done without a *prepoſition* and a *noun*; as *prudently*, for *with prudence*. See *Locke* on the particles.

4. *N. B.* Verbs and conjunctions, ſignify the manner of our diſcerning between our ideas or the form of our thoughts, and not properly their objects.

All the other parts of ſpeech ſignify the *objects* of our thoughts.

Of the Tenſes, or Times, of Verbs.

TIME, as *Varro* well obſerves, is three-fold, *paſt*, *preſent*, and *future*; and each of theſe is twofold, *imperfect* and *perfect*, according as the diſcourſe is of a thing *unfiniſhed* or *finiſhed*. See Mr. *Hoadly*'s grammar, and Dr. *Clarke*'s Hom. Il.

The Paſt. { Imperfect. abibat. he was going. / Perfect. abierat. he was gone.

The Preſent. { Imperfect. abit. he is going. / Perfect. abiit. he is gone.

The Future. { Imperfect. abibit. he will be going. / Perfect. abierit. he will be gone.

N. B. The preter-perfect tenſe ſignifies either *definitely*, that the thing is juſt paſt, and ſo anſwers the preſent perfect, as, abiit, he is gone; or *indefinitely*, as, abiit, he went away.

N. B. The infinitive mood ſometimes loſes the affirmation, the property of the verb, and becomes a noun ſubſtantive, as, *to ſin is a ſhame.*

Sometimes it retains the affirmation, as, *Scio malum eſſe fugiendum*, I know evil is to be avoided. Here the infinitive mood, beſides the affirmation of the verb, joins the propoſition, in which it is, to another. Thus, *ſcio* is one propoſition, and *malum eſt fugiendum* is *another*; but putting *eſſe* inſtead of *eſt*, you

you make the laſt propoſition but a part of the *firſt*.

This way of joining propoſitions by an infinitive, is chiefly in uſe, when we make one part of a diſcourſe have relation to another.

Verbs are infinite, that is, not confined to one perſon or number; or finite, that is, confined to one perſon, and of one number.

This mood is called *infinitive* becauſe it indefinitely marks affirmation without number or perſon.

Infinitat numerum et perſonam.

A verb active ſignifies an action, as, *to beat*, which is a real action determined to a *ſubject*; or, *to love*, which is an intentional action determined only to an *object*.

A verb paſſive ſignifies paſſion, or the effect of action, as, *to be beaten, to be loved.*

Verbs neuter, or intranſitive, are of two ſorts; the one does not ſignify action, but *a quality*, as *friget*, *it is cold*; or ſome ſituation, as *ſedet*, he ſits; or has ſome relation to place, as *adeſt*, *he is preſent*; or ſome other ſtate or attribute, as *quieſcit*, *he is quiet*; *regnat*, *he reigns*, or *is a king*.

The other verbs neuter ſignify *actions*, but ſuch as terminate in the agent, and do not relate to a ſubject or object different from him, as *gaudet*, he rejoices, or *is glad*.

Nevertheleſs, theſe latter ſorts of verbs neuter ſometimes become *tranſitive*, when a ſubject is given them, as *to die the death of*

the

the righteous. But it ſeems probable that this latter way of ſpeaking was occaſioned only to mark ſomething particular that was not entirely contained in the verb, as when one would ſay, *he lives a ſhameful life*, which is not contained in the word *vivit*, *he lives.*

The time paſt is definite, which reſpects a certain, or particular time paſt, as *I ſought for thee yeſterday*; or indefinite which does not refer to any particular time, as, *I have ſought for him.*

Further; if you ſay, *As ſoon as he ſaid this, away he goes.* Here the hiſtorical ſtile paints a thing paſt as preſent.

As ſoon as he ſaid this, he began to go away.
This expreſſes a ſlow motion.

As ſoon as he ſaid this, he went away.
This manner of ſpeaking is more general, and ſhews not whether the motion is ſwift or ſlow.

As ſoon as he had ſaid this, he was gone.
This expreſſes an exceeding quick motion.

F I N I S.