

CHAPTER 1
GENERALITIES

Zilu asked Confucius: *If the Prince entrusted You the Government, what the first measure? And the Master: A reform of the language, undoubtedly. It is impossible to develop valid discourses if the nouns are not correct.*

1.1. In my opinion, the very consequential mistake affecting the current logic hides, so to say, in its constitutional flatness. At first sight, to by-pass meanings (fuzzy and elusive entities) in order to deal with signs (well determined and tangible objects), seems a quite advantageous choice. Yet such a decision presupposes erroneously that the meaning-stage is by-passable as an unessential intermediate landing. A theory which puts on the one hand things, properties, relations, and on the other hand nouns, adjectives, verbs, neglects the real protagonist of whatever *logos*, that is the knower (the intelligent organism) whose presence is absolutely necessary in order to settle a contact between the sphere of referents and the sphere of signs. Logic does not rule the world; it does rule the knowledge of the world: what space could logic have in a galaxy without any gnosiology? But where is the gnosiologic dimension in the current theorizations? An approach reducing a tridimensional matter to bidimensionality is intrinsically inadequate, and since the neglected third dimension is just the informational one, only a logic of information can overcome this inadequateness.

1.1.1. To avoid misunderstandings, I am not claiming that the current theorizations are sterile; they are partial and reductive like the visit of a doctor who were to look at his patient exclusively through a little mirror. I claim that the only logic compatible with our common sense must be grounded on the concept of information, and that such a concept, wherever a linguistic component occurs in the process, is nothing but the concept of meaning, an indispensable *trait d'union* between sign and referent.

I recognize that to speak of meanings *ex abrupto* is a license. I agree with Chomsky where he says (I quote by memory) that the problem of meaning is huge and confused; modestly, my detailed notes on a semantic theory, though still in progress, already occupy hundreds of pages. For the moment I acritically appeal to the reader's intuitive meaning of "meaning", provided he agrees that pieces of information (then meanings) are a question of neurons.

1.2. Advanced natural languages possess splendid faculties of self-improvement. Nevertheless, obviously, the first steps of the improvements can only move from the not yet improved situation. So I feel myself like an electrician who, called to renovate a plant, uses the old one to illuminate his work. Anyhow the renovation that I will agree on in this book is limited to fill up the gaps whose filling up is necessary to achieve the purposed results.

1.3. The concept of information is polyvalent (information about something, information as something et cetera). Here I do not analyze it; I simply specify with a propaedeutic aim what I mean when I speak of information. And since I think that many potential misunderstandings follow from a too ambitious schematization of highly complex universes of reference, for the moment I focalise the outcomes of tossing a standard die.

The concept of information is strictly linked to the concept of knowledge or, even better, to the concept of ignorance. A (non-null) piece of information (concerning a certain phenomenon) is any acquirement reducing our ignorance about such a phenomenon. Let me toss the die and let me suppose that we attain only to see the centre of the resulting face, so ascertaining the presence of a dot. The possibility space Ω (that is the set of all alternative outcomes) is $\Omega = \{1,2,3,4,5,6\}$. Then our acquirement (a dot in the center of the face) is a (non-null) piece of information (concerning the toss under scrutiny) only because it allows to exclude 2, 4 and 6 from Ω . In this sense a piece of information (concerning a certain possibility space) implies the reduction of the possible outcomes.

Of course the piece of information we can draw from a certain acquirement depends also on our previous knowledge. We continue referring to the above mentioned Ω , but if in a standard die the dots of a face were the vertexes of the correspondent regular polygon, the same acquirement (a dot in the centre of the face) would exclude 3 and 5 too, so allowing us to infer that the outcome is 1. And as soon as the possibility space reduces itself to a single alternative, the outcomes cannot be further reduced (actually, once we know that the outcome is 1, under Ω no further information about such a toss can be acquired). The sight of the whole face could only confirm a piece of information we already know (the central dot is the only one). Just on these grounds I say that the logic of information must be idempotent (§7.1.1).

1.3.1. A pedantry. Above I wrote "under Ω no further information ... can be acquired" to specify that the many further pieces of information we can acquire once we know that the outcome is 1 (as for instance the position of the die on the green baize) do not concern the possibility space under scrutiny, since it classifies the different outcomes as regards exclusively the number of dots marked on the six faces. And as soon as we refer to a more complex possibility space, the outcome 1 contains a plurality of sub-alternatives, so then further information is possible.

1.3.2. The possibility space approach could be replaced by a (Kripkean) possible worlds approach. Yet I strongly prefer the former because it seems to me that our effective gnosiologic life refers spontaneously to only one world and to acquisitions able to reduce our ignorance about possible outcomes (in other words: the possible worlds are nothing but a fictitious way to deal with possibility spaces born by our ignorance about the real one).

1.4. If a is a state of affairs (for instance the presence of a dot in the centre of the face) concerning the universe of discourse Ω , (the tossing of a standard die) then $k_{a,g,t}$ is the piece of information (the image, the neuronal pattern) the knower g possesses about a at the moment t . By " $\gamma_{g,t}$ " I generically indicate the cognitive relation (for instance the sight of the central dot) between a and $k_{a,g,t}$ ($k_{a,g,t} = \gamma_{g,t}(a)$). The Ω - g - t -statute is the union of the pieces of information about Ω possessed by g at t , that is, so written concisely, $k_{\Omega,g,t}$. (for instance the knowledge about the dots marking the various faces of a cube, about the tossing procedures et cetera).

If we refer to an ideal knower ig (an auspicious acronym, indeed) the specifications "for g at t " can be omitted since, thanks to a *hot line to God*, an ideal statute is not subjected to chronologic or personal variations.

1.5. The concepts of information and of communication are strictly related; in fact a communication can be defined as a process of transferring information. Yet the concept of information is extremely broader, since the main channel to acquire information (the only channel, for millions of years) is (was) quite independent of any communication (as in the example above). Then, while the concept of information implies the figure of a knower (or interpreter, or receiver) it does not imply the figure of a speaker (or sender). A sound reason to privilege the viewpoint of the interpreter.

1.5.1. In *Fedro*, Plato argues in favour of spoken languages and against written ones. Without discussing the topic, here I agree that, on the contrary, my discourse will mainly focalize written languages. Therefore expressions like "speech act", "utterance" et cetera will be used without any intrinsic reference to the phonic dimension.

A systematic theorization of the matter will be proposed in a subsequent book specifically devoted to such a task. Here I only sketch a linguistic process of communication performed under the most simple conditions (so lies, mistakes of codification, noises, distrustful interpreters, emotional components et cetera are banned). In compliance with this frame

to communicate

is schematically analysed as a tetradic relation: someone (the speaker) communicates something (a piece of information), to someone (the interpreter) by means of something other (the uttered expression e). Incidentally: personal note-books (or, where non-verbal communications are admitted, knots to handkerchiefs) show that speaker and interpreter are not necessarily distinct persons; anyhow, even where the speaker is also the interpreter the relation continues being tetradic, exactly as the division of a number by itself continues being a dyadic operation.

1.6. In order to speak of something we must use signs. Not only we can speak of the Koh-i-noor without exhibiting the diamond, but if we exhibit it, we are no longer speaking of it, we are exhibiting it.

Signs are intrinsically means to adduce conventional information ("to adduce" is just the technical term to express the semantic relation σ between a sign and the conventional piece of information it is the bearer of). Being the source of a σ -relation is the essential requisite in order to be a sign (without such a requisite, a sign would only be a mute object merely displaying itself as a blade of grass in a meadow). The σ -relation is necessarily mental: The linguistic faculty is just the mental faculty of stating conventional associations between arbitrary couples of informational nuclei. The best evidence is the sovereignty of the decision through which we can assume any object as a name of any other object; a sovereignty showed by the possibility of establishing such an assumption in complete darkness and silence and immobility.

1.6.1. Any language is a code; then any codification or decodification depends on the language we are referring to. Yet for the sake of concision (cf. also § 1.9.2 below) I agree to make explicit such a reference only where the context could otherwise entail some ambiguity.

Let e be a sentence (of a language L). I say that (in L) e adduces the piece of information $h_{g,t}$ iff in g at t a (mental) relation $\sigma_{g,t}$ does exist such that $\sigma_{g,t}(\gamma_{g,t}(e)) = h_{g,t}$. I call generically "semantic" the relation σ .

Of course the relativizations to g at t can be omitted where reference is made to the ideal knower.

1.7. The basic process of communication can be roughly sketched as follows

- the speaker g' intends to communicate a piece of information h_g .
- the speaker knows that h_g is adduced by e (linguistic codification)
- the speaker utters e
- the interpreter g'' reads e
- the interpreter knows that e adduces h_g (linguistic decodification)
- the interpreter acquires h_g .

Thus a process of communication is partitioned in two stages. The enunciatory stage leads the speaker to find and to utter the expression adducing the piece of information to transmit, the interpretative stage leads the interpreter to draw the piece of information adduced by the expression he reads.

Some comments.

- 1.7.1. Of course the scheme above is oversimplified. In order to generalize it we ought, at least,
- introduce chronological indexes (for instance the moment g'' reads e may differ from the moment g' utters it)
 - the speaker may adapt the enunciatory stage to the interpretative stage he presumes and vice versa et cetera.

Yet these pedantries are of no moment in the present analysis whose only aim is emphasizing a clean distinction between signs (e) and pieces of information (h). Moreover a not less clean distinction is emphasized between pieces of information and referents. For instance the speaker may intend to communicate that it is raining quite independently of the actual meteorological situation.

1.7.1.1. The same sketch can be easily conformed to peculiar situations. For instance situations where the message to communicate concerns in its turn a meaning, or where the code is non-verbal (a non-comprehension communicated by a grimace instances both).

1.7.2. To speak of meanings is incompatible with an extensional approach. Indeed the severe war between extensionalists and intensionalists seems rather gratuitous to me. A bipartisan intensionalist approach witnessing our actual and evolutionally tested gnosiologic procedures seems to me the best one. Just as the easiest way to analyse the opinion of a guard controlling the guests is extensional (the guard is called to ascertain whether the (name of the) person under scrutiny belongs to a list, quite independently of his/her underlying requisites), the easiest way to analyse my opinion about the little animal squatted beneath the bush is intensional (I think it is a rabbit because I saw that its physical connotations and its behaviour are characteristic of the species, surely not because I ascertained that it belongs to a set the majority of whose members are unknown to me).

1.7.3. The speech acts we shall deal with are declarative, yet also performative speech acts (such as questions, commands and so on) concern processes of communication, since anyhow they adduce some piece of information (a question informs the interlocutor(s) that an answer about a certain argument is wished, an order informs the interlocutor(s) that a certain behaviour is required and so on).

1.8. Usually, in a specific process of communication, an important role is played by what Nørretrander (1998) calls "exformation", that is by the unexpressed body of knowledge the speaker and the interpreter share. It seems to me that the correct approach to the topic entails a clear distinction between

- the piece of information constituting the strict (content of the) message
- the piece of information which, on the ground of his previous statute, the interpreter can infer (I evoke the tossing of a die).

The example of the dots marking the various faces is enlightening. If the speaker utters

(1.i) the centre of the face is marked by a dot
the interpreter infers

(1.ii) the outcome is either 1 or 3 or 5
if he thinks that the faces are marked in the usual way, while he infers

(1.iii) the outcome is 1
if he thinks that the faces 3 and 5 are marked in the vertexes of the respective regular polygon. And of course the speaker can be perfectly aware that the piece of information he transmitted is not the mere (1.i) but, according to the real disposition of the dots, it is (1.ii) or (1.iii). The intriguing study of the various intents moving the interpreter is here forbidden by the above agreed restrictive conditions.

Once these considerations are extrapolated from the analytically classifiable possibility space of a die (then from a set of analytically foreseeable inferences) to the extremely complex possibility space of our old world, the concept of exformation tends to assume a less sharp profile.

1.9. No care is wasted if it can preserve the interpretation of a text from ambiguities. The basic requisite is simple: not to entrust the same sign with different semantic tasks. That is, briefly: no homonymy bearer (no word adducing more meanings). Homonymy is our irreducible enemy, since as soon as an informational non-identity is hidden behind a signic identity, a potential source of incoherence is introduced in the process of communication. And the less clear our ideas about the various pieces of information adduced by the sign are, the more insidious the homonymy is. In this sense the worst one is an autonymic homonymy, where the same sign is one of its possible referents. In the final chapter an astonishing example of the dangers born by an analogous context will be studied in detail.

1.9.1. A less hasty analysis of homonymy bearers suggests a specification. While “sentence” is used to mean a syntactic entity (that is a concatenation of words respecting the well formation rules) and “proposition” is used to mean a semantic entity (that is the piece of information adduced by a sentence), “message” will be used to mean either a sentence or a proposition (so “message” is institutionally a homonymy bearer). I keep this double acceptance not because a homeopathic war against homonymy suddenly seduced me but because there are peculiar problems (for instance the problem concerning the *objects of truth*) whose discussion is highly assisted by some homonymy bearers; in fact only if the problem can be formulated by an ambiguous word, its solution is not anticipated by the same formulation.

1.9.2. In natural languages homonymy bearers are very numerous. So then at first sight, it may seem a miracle that in our current linguistic practice we can deal with them without being continuously misled towards wrong interpretations. No miracle, since we are helped by the rule usually called “principle of charity”, according to which any sentence must be interpreted in the way optimizing the adduced meaning. I prefer to call “criterion of (interpretative) collaboration” such a rule and, above all, I wish to extrapolate its range to non-linguistic contributions too, since actually our interpretations are influenced by non-linguistic sources of information too. For instance

(1.iv) I wish to buy a black pen

is spontaneously (and correctly) interpreted in two different ways if (1.iv) is uttered in a swan-breeding or in a writing material shop. Analogously, since neither a female swan nor an instrument for ink writing can reasonably enclose a pig, the reading of

Bob wishes to buy a pen to enclose his pig

suggests the perplexed interpreter to ascertain whether “pen” adduces a third meaning; and actually any perplexity disappears as soon as he learns that a pen is also a small enclosure for animals.

1.9.2.1. An even more evident application of (1.iv) concerns situations where the homonymy bearer has different syntactic statuses. For instance, both

(1.v) Bob felt cold

and

(1.vi) Bob’s felt has been manufactured in France

would be word salads if we should read “felt” as a substantive in (1.v) or as a voice of “to feel” in (1.vi). But by the simple fact that the two reciprocal readings lead to sensible statements, such readings are automatically assumed. Anyway the criterion of collaboration is peculiarly applied to homonymy bearers with a common syntactic status, that is situations where the possible interpretations concern an anyhow well formed sentence.

The above decision (§1.6.1) to specify the language of reference only where necessary can be legitimated just by an appeal to the criterion of collaboration; since normally if we read in L_1 a proper L_2 -sentence, we face a senseless expression, it is our duty to choose the language the sentence under scrutiny belongs to.

1.10. Under the current notations italics, though implicitly, is a polyvalent type. In fact, besides some fanciful applications I neglect, it is used

- for symbolic expressions
- for expressions to emphasize
- for expressions belonging to foreign languages
- for direct quotations

(in the last chapter we shall see that italics is also the type Goedel chose for arithmetization).

I disapprove of this multipurpose practice which, among other inconveniences, forbids focusing more subtle distinctions (for instance, direct quotations are a wide topic where heteroquotations ought to be distinguished from autoquotations, sub-quotations and so on). Nevertheless I will resign to follow that practice with the only exception of the bold type for expressions to emphasize. My resignation follows from the conviction that to introduce a really satisfying set of graphical conventions would mean to lose even the best disposed of my few readers. The aim of these simple considerations, then, is to remark that my decision is a bitter compromise.

1.11. On the contrary I cannot accept the current diacritical notations, since they are quite insufficient for my requirements. To enrich them is an indispensable step towards refining any approach to logic. I realize that my claim is unusual and perhaps presumptuous (*ideas are lacking, not the means to express them*, annotated Leonardo); nevertheless I hope that the next pages will legitimate it. Indeed mankind did without zips when only buttons existed, and did without buttons too before their invention, yet even emperors got dressed; nevertheless so unquestionable an evidence neither entails that buttons and zips are useless, nor that a note like *dresses are lacking, not the means to close them* eliminates the problem.

More than seventy years ago Morris, genially, denounced the poorness of the means by which natural languages can speak of themselves: but till now what improvements have been realized? And almost half a millennium ago Montaigne, genially, wrote: *la plupart des troubles du mond sont grammariennes* (the troubles of our world are for the most part grammatical). With the aggravating circumstance, nowadays, that symbolic troubles add themselves to

grammatical ones. Indeed the incapacity for realizing the insufficiency of the current diacritical notations is born by the opacity (the flatness, let me repeat) of the perspective through which the whole gnosiology is studied.

1.11.1. Also the worst symbolic convention, that is the universal habit according to which affirmation is expressed by omitting the symbol of negation, can be classified as a failure in the diacritical notations.

1.12. Orthodoxy states that the first aim of a formalized language is to settle a clear pattern able to explain how natural languages work and to show their limits. Although in due course formalized languages will be used massively. I exhort the reader not to mythicize them: just as a definition cannot allow new theorems to be proven, a formalized language cannot open new heuristic horizons. In fact, if natural languages should be conditioned by some limits intrinsically permeating our mind, the same limits would condition too whatever artificial language we can elaborate; and if such limits can be by-passed, then we have the faculty of refining directly natural languages.

Anyhow the final chapters will show that the main danger entailed by formalized languages is their absolute (yet only presumed) trustworthiness.

1.12.1. A natural language can be compared to a house obtained by successive enlargements and repairs from a very old nucleus: it is not rationally disposed, is lacking of some comforts et cetera, nevertheless the centuries of its story gave it an already tested usability. A formalized language, on the contrary, can be compared to an aseptic scale model very fit for certain applications, but surely unfit for lodging. evacuees.

1.12.2. Incidentally. The current claim that our thinking activity is necessarily linguistic seems to me radically untenable: if it were, by what kind of activity should natural languages be born?