Using language to tell the truth[1]

January 2023
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ABSTRACT

To tell the truth avoiding ambiguity, it is necessary to link accurate information to words of the language. In language learning, a perceptual element is present at the origin and accompanies the use of introduced expressions. This element constitutes a sort of connection with reality, making efficient communication between speakers possible. In the following phases, the language is at the service of diverse needs, the connections and the original information are dispersed in a complex communication network in which, as they say, the anchor points have a peripheral position. What we want to focus on is a particular use, the assertive, for which in some cases a phylogenetic relationship can be traced with 'primitive' uses (such as: 'look!', 'This is a ...' ...). We would like to discuss from a philosophical point of view the information and the ability (competence) necessary to use expressions indicatively.

1. Semantics and ambiguity of names

Usually a distinction is made between type expressions and their phonic/graphic utterances. It may be convenient to make use of such a very popular distinction at least until believe one has found philosophical stone in the pair type-token. There would be many things to say about the use and abuse of the pair of terms in philosophy. At least two groups of issues are worthy of a detailed study: the use of the distinction in setting/solving the problem of universals; the use in solving/dissolving the problem of ambiguity. These are discussions that I judge worthy of attention not in terms of their content or the solutions proposed but for the relevance they have had and continue to have in scholastic philosophy.

Talking about the grammatical properties of nouns (having a gender, a category…) one can ask who their bearers are. We will say the noun itself, but how do we know

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this, or how can we verify that a noun like 'George' or 'tree' is of the singular-masculine gender and belongs to a certain lexical category? The answer is quite simple: since it is not a physical but a grammatical question, a competent speaker can say *yes it is* or *no it is not*, based on the information he has acquired in the learning process. So for example, a competent speaker could answer the question: 'what is the proper noun 'George'?' by saying that it is a particular grammatical entity. He/she could further answer the question 'is this the name 'George'?' by saying, if that's the case, 'yes it is'.

When one is interested in determining the truth-value of a sentence, the questions he/she has to ask are at least these: a) what the sentence is about, (b) how I can identify that thing, (c) whether I have enough information? If we are able to answer in the affirmative to (c), the further question we cannot always answer is: does the information we have allow us to assert something in a non-contradictory way? What I am saying might not be so clear, so let us start again considering the reference of 'the name of George'. The information we have is mainly of a visual nature: we have learned to read and we are able to recognize the written or pronounced name with a certain precision.

We have school information that allows us to tell when faced with a certain inscription that it is the name 'george'. Automatic devices have information and ways of processing it different from ours but they are expected to recognize what we ourselves recognize. Are there more inscriptions? In any case, we are able to say that it is the same name. So since the same thing is found in several different places, is it an abstract entity? I don't know what an abstract entity is, I might even define it but I don't think it is relevant in this case. Is there a difference between the inscription and the name? Sure, but we say of the inscription that it has some kind of matter and do not say that of the name. Are we in the presence of a concrete-abstract distinction? Again the question, assuming it can be posed clearly enough, is irrelevant here.

Rather what matters is whether, having recognized the same name by exploiting the information that was at our disposal, there is the possibility that the supposedly true statements concerning what it refers to are in contradiction. That is, what one might think is that by saying that something is written here and at the same time it is also written there, we run the risk of contradicting ourselves. But let's see if this is actually the case. The closest thing to a contradiction would be to say 'the name 'George' occurs on page i in line j and occurs on the same page in line w'. Obviously this is not a contradiction, but only an assertion that we are able to make by observing a given fact. Conversely, in the case of an inscription the information includes positional and physical aspects. This leads to the trivial fact that a name

can be written several times and the graphic sign only once. Grammatical properties do not concern the different inscriptions or pronunciations of a name but the name itself.

Similar things can be said of semantic properties: George's name is a single thing that is placed in correspondence with George. We are inclined to accept the formula as speakers of the language: 'George' is the name of George. We implicitly assume that there is only one name and - without thinking too much - that there must be only one bearer of the name. Here things get complicated. I have just said that we implicitly accept the validity of the schema 'George' $\rightarrow$ George, but what does it mean? We certainly have some grammatical information related to the name but we may have, not have or partially have semantic information that allows us to apply the name to a bearer. What's more, the information we have may or may not lead to contradictory statements. It should be kept in mind that just as the grammatical properties concern a single grammatical object, the same must be said for the semantic properties.

Suppose we start from the information that George is the name of George. We soon realize that there are more people named George and therefore for some property F George has F and George doesn't have F. What's wrong? My point is that the semantic information associated with George, in this minimal case, is not sufficient to identify a single George. I believe that this is the cause of the contradiction and the solution is to increase the semantic information. We will say that the information is (in part) implicit and there are multiple ways of making it explicit. The proper name with information that does not allow the identification of a single object is ambiguous, i.e. for different completions, the formula ''George <…>' is George's <…> nominal phrase' acquires a specific meaning. A name is univocal iff it is coupled with information that makes it possible to identify a single bearer. In the case of an ambiguous name, the formula without completions or one of its variants has no truth value.

I would like to end this brief discussion of ambiguity by telling (my version of) a story. Once upon a time there was a boy who received the name 'Andrea'. Those present at the baptism ceremony receive a certain amount of information, some of which is recorded in personal data and constitutes the necessary and sufficient conditions for identifying the baptized person: date, parents, gender, witnesses, place of birth... Whoever says that 'Andrea' is Andrea's name *by implicitly associating* this information with the name is saying something sound. We are almost never so lucky with names, the information is partial, not shared or completely absent. This leads to situations of ambiguity, but often has no practical consequences (I know a person because he was introduced to me but the information information may not be shared, be partial, or in any case such as not to make the meaning of the term determinate).

So, proper names should be thought of as associated with information that make it possible to identify a certain object. The same can be said for other types of nouns and expressions belonging to different lexical classes. The process of learning or stipulating meaning is very different both in terms of the information provided and in the empirical or disciplinary or technical context in which it is provided (see *infra*). In any case, in order to assert that a name 'x' refers to x, information allowing the identification of x must be available. I will say something later about the different types of names and the limits of identification, what I wanted to anticipate here is a way of considering the problem of ambiguity by looking not only at the name considered as a single self-standing 'entity' but also at the information that is related to it.

A final note on the concept of semantic indeterminacy of nouns. In one sense it can be said that the indeterminacy is due to the ambiguity. For instance a proper noun 'x' is ambiguous if there are several information packets $1..n$ such that 'a' can be used indicatively for a in relation to each of the packets $1..n$. We can say that 'a' is used in an indeterminate way when it is not used indicatively. The concept of indeterminacy has to do with the non-indicative usage where we pronounce a name having little or no information. On the other hand one could also call indeterminate an indicative use where the information has been deleted/forgotten. An atomic sentence in which a term used in an indeterminate way (in this sense) occurs is similar to a propositional function that contains an unbound variable.

'Indeterminacy' in another sense has a meaning inclusive of ambiguity and vagueness. Understood in this sense, indeterminacy has two aspects: one informational and another of information retrieval. The ambiguity depends on a lack of information; the vagueness depends on the non-definition of the limits, fields and procedures of recognition. We usually have enough information in the case of vagueness but we don't always know how to apply the noun, also because the boundaries of identification are not established. It is not easy to define procedures and identification intervals: as I will say shortly, this is a human limit rather than a mechanical one. It seems interesting to me that the problem of establishing necessary and sufficient conditions of identification is not usually felt as such, we use language efficiently in communication and in our personal affairs without feeling the problem. This must be taken into account as well as the fact that the use of language to tell the truth is a very particular and difficult use to learn.

2. Identifying objects

Linguistic expressions are often used to indicate things and to establish whether or not they stand in a certain way. We talk about things, but often we are not able to do so precisely and unambiguously. The only tool we have to indicate things or make statements is in most cases natural language. The apparently paradoxical situation is the following: we express ourselves using imprecise language but we understand each other and we are able to find the things we are talking about with a certain precision, to report facts, to verify statements. Thousands of people bear the Italian name 'Andrea Bianchi', we do not have a more 'precise' proper name than this, however we can identify the Andrea Bianchi who interests us in a way that can be made unambiguous. What does this allow? How can we express it? The answer to the two questions is the subject of this paragraph.

In general it can be said that I identify individual objects or objects of a certain kind based on a set of information that is somehow accessible to me. This information mostly operates implicitly, it is the task of linguistic-philosophical analysis to bring it to light. The following proposal is subject to change or supplement based on conflicting evidence. Access to information is possible through routines. A name for one of these is 'punctual identification' others can be described, e.g. 'Identification in an interval', or 'instrumental identification in an interval'. The routine is partly defined by its target: a routine that searches a database will differ in its objective (and not just in the work it does) from one that tries to identify an empirical object whose information is (also) acquired through a sensory apparatus. We will call *mesh* a structure consisting of a set of information and an identification routine. Let's say that a mesh is functional if the set of information is such as to make the routine doable. The information tells us what the object is and where it is. It can be written in the same language as that of indicating expression or in a different language, not necessarily natural. The same terms in use can be part of the 'internal language' of a mesh, possibly together with other encoded information: in the case of proper names personal reports, photos, footprints, etc. can be considered (and in fact they actually are). The additional linguistic material may or may not have the form of a definition or scientific notation (water $\rightarrow$ H2O). To identify one or more objects one also needs to know where to conduct the search. In this we are different from a scanner that simply waits for things to present themselves in front of its perceptual apparatus.

The set of information necessary and sufficient to determine an identification interval should not be confused with all that is known about the thing identified. As language users we have a great deal of information for identifying objects. We can

ask ourselves how to make it explicit and if it is necessary and sufficient. Obviously we are at the end of a process of acquiring knowledge in particular of a propositional type, but this does not always affect the ability to recognize, which is generally acquired in the language learning phase. There are two important differences: the first that there can be different pieces of information in relation to the different uses of an expression, the second that sometimes the information is not shared. When writing information in a mesh, it must be considered whether an abbreviated form should be used, an additional or metatextual indication, depending on the case.

Sensory information. For many of the terms in use, the information is visual: I have a visual memory of a tree, of a man, of a triangle, of the numeral 3. This piece of information is shared, as we have all seen things of a certain sort by learning to use their name. A sensory routine is supposed to play the role of establishing the congruence of the shapes perceived within a deformation field. In a mesh this kind of knowledge will be indicated - if available - as 'sensory information'. This may be fine for a number of commonly used terms, but not in cases where the information is not shareable. Visual data could be necessary and sufficient to identify something even in the transformed form available to a blind user (e.g. the transformation of visually distinguishable characters in the Braille alphabet).

Textual information. Visual information is not always the same for everyone and there can be different information for the same expression. Two examples: different people have learned to use the same expression (I do not think we need to distinguish between occurrence and type) to indicate different things; one person did not use that expression to visualize a thing but acquired different information by other means. The information linked to the terms can be put in the explicit form of adverbial apposition or determinations or other linguistic devices added to expressions. In the case of proper nouns we need to use this kind of addition due to the unavailability of sensorial shared information. In instrumental cases, there is also a replacement of sensory information with that relating to measuring apparatus for practical reasons.

Metatextual information. I have said that the amount of information we have at the end of a process should not be confused with what is needed to start the process. In some cases, however, the beginning and the end of the knowledge acquisition process are inextricably linked. When we ask ourselves what information can be associated with a 'vector space' or 'electromagnetic radiation' or 'angular moment' it is difficult to imagine that the information is specific and does not involve an entire theoretical apparatus. As well as the terms linked to initial definitions by a chain of logical-mathematical deductions, numerous examples of this type can be imagined. What is needed to make an unequivocal use of a term in

cases like these is the reference to the theoretical apparatus in which it plays a theoretical role.

A routine has an identification target which is of the types listed above: empirical, theoretical or documentary. As to sensory information, we are able to recognize objects and retain the ability to recognize them within certain limits when there is a change in shape. A table is recognizable as such in its different shapes and sizes; when it is altered in such a way as to take the shape of a chair, it is no longer recognizable as a table. I refer to this 'ability' as a sensory routine. When it comes to textual or meta-textual information, the search must take place on texts, repertoires or databases of some kind. This concerns our ability to read and memorize texts. Based on this we can define a recognition interval. This fact alone does not involve identification but is a necessary condition.

Indicative use[2] requires different degrees of regulation. A proper name is used indicatively when and only when - based on the information - only one object is identifiable. If we identify more than one, we have a dysfunctional use, that is, outside the scope established for the indicative use of the name. If, on the other hand, we take a name of a commodity, such as 'milk' or of a natural genus such as 'tiger', what we would like to identify are tigers (which count as one but are many), based on a certain range of recognition. This interval may have a greater or lesser opening depending on the recognition devices, but in any case it has fixed extremes and an accepted variation margin, what in the mechanical case is called the sensitivity of the instrument.

To think about a mesh, it may be helpful to look at mechanical devices. The concept we want to capture is that of intended indicative use, that is, the use of an expression of language to indicate one or more things in an unambiguous or vague way. The mechanical devices and the programs that manage them are developed by us to emulate and improve on our own behavior; in fact, there is a class of mechanical devices that play the role of identifying objects and labeling them. We will begin by considering some automatic devices. The analysis is favored by the fact that coded information and instructions can be exhibited. Within certain limits, a system performs the role we have assigned it in a deterministic way; moreover, it is deterministic regardless of the controls. In the human case, for obvious reasons, things are more complicated or elusive.

A mesh (for the indicative use of a certain expression by a mechanical device) can be seen as a set of coded information stored in memory and a program. What must be accepted is a certain coded input; the result of a computational process is to

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[2] I ask the reader for some benevolence: I would not like to adopt the terminology of reference for reasons that will be clarified later, so I will not speak of 'referential use'. 'Indicative use' for me is as good as 'use that is made in pointing to something'. In fact it is a small linguistic deviance that costs much less than Peirce's neologisms.

connect the input to information in memory and, where opportune, write a certain expression or perform an action. For example we can look at a scanner, say the type used in a store: the coded input is on a product, the machine associates a name and a price to this input, printing the same expressions on a receipt. When we consider natural language expressions, in some cases we can define a computational information structure, in others not. We must ask ourselves in what sense we can speak of a deterministic process.

In the case of a fingerprint, a face or a letter, the program manages a certain number of topological transformations in a deterministic way. The outcome of the process is the recognition of something that eventually leads to the printing of its name or some other message, in addition to other database processing. My fingerprint reader hardly recognizes me; however, the program that manages it is deterministic. Environmental conditions and the way in which the input is presented do not allow the device to process information, roughly expressed: if the program has a line of the type *if A, then B*, A may not be given in the encoded form, therefore step B does not follow. However *if A then B* is a deterministic line in the program. This has some interest for both the mechanical and the human case: a distinction must be made between events of non-evaluation and situations in which deterministic conditions cannot be specified.

Before proceeding further, I would like to focus on the 'competent' use that is made by a device and on its limits. When I talk about problems running a program I don't mean conflicting readings due to environmental causes or the intervention of a piece of external apparatus or other factors, what matters for the present discussion are: 1) discordant results due to bugs 2) results inconsistent with deterministic programming. 3) lack of identification. It is necessary to pay attention to the fact that the indicative use that we are trying to define in both the mechanical and human cases corresponds to unique instructions and deterministic executions. Therefore what we need to look for is dysfunctionality in deterministic programs.[3] In the non-deterministic case, different outputs are however provided, if we are not faced with a dysfunction, the work can be well done but the purpose is not to identify and name a single object or group of objects.

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[3] See, among the numerous studies on the subject, M. Sipser (2013). in the case of a finite automaton 'If you were uncertain about whether finite automata were allowed to have 0 accept states or whether they must have exactly one transition exiting every state for each possible input symbol, you could consult the formal definition and verify that the answer is yes in both cases…' (p.35) In a nondeterministic machine 'several choices may exist for the next state at any point. Nondeterminism is a generalization of determinism, so every deterministic finite automaton is automatically a nondeterministic finite automaton.' (p.47).

A first case to consider is that of the programming defect. If the device is deterministic there cannot be multiple answers, but in principle it may happen that, under the same physical conditions, conflicting answers are obtained. I mean not due to changes in processing a certain input or physical modifications of the system, both micro and macro, but dependent on programming. Once the various factors that can produce the error have been isolated, if discordant results are obtained, it must be concluded that the use is not unique and the system must be reprogrammed. This is a delicate point, one must examine the behavior of the system and distinguish between internal and external factors. Distinguishing may not be easy and it is not certain that, even having isolated the disturbing factors, this kind of error will be detectable.

An example may clarify the point: suppose we have a facial recognition program. The system receives an encoded input and processes it according to a certain algorithm. On a first reading it writes 'John', on a second reading of the same subject 'Henry'. All things being equal, we must conclude that there is a programming problem. This means that 'John' is not used appropriately, as the system recognized both John and Henry, but that cannot be the case, so 'John' does not stand for John. We have assumed that one and only one name is written for a certain input; it follows that the program (informational structure) is dysfunctional. Reasoning in the abstract, the program may or may not be functional, in the sense of producing one and only one outcome, this is a fact which, however, can be difficult to discover in practice.

Note that a systematic error due to the mechanical constitution of the device running a recognition program does not mean that the use of the expression is not deterministic. A slightly different problem is that of injectivity: there are no programming problems but Henry is constantly called John: different objects, coded differently, are associated with the same name. Looking at the expected results, it might be thought that there is an error, but from the point of view of the machine, there is not: different inputs are labeled in the same way, therefore the answer can be completely consistent with the deterministic character of the system. What should we say about the use of the expression 'John'? What I would say is that the system makes a common use of the proper name, or allows for systematic ambiguity.

As to the non-response. There are two cases, a) non-recognition of the input as the physical conditions do not allow detection; b) recognition but failure to carry out the instruction. A device does not remain in doubt: the program imposes certain limits of recognition, the answer is only one and the non-response is equivalent to a non-recognition: let's think of an object without a barcode passed in front of a scanner at the cash desk. The ability to recognize depends on the programming of

the device; we would like to say that the use of an expression of the output language corresponds in some sense to a precise class of events. It seems to me appropriate to point out that this is not data, but objects corresponding to use, even if they are precisely the objects that the system can actually recognize.

3. From a human point of view

Before talking about human information structures, I would like to consider an intermediate case represented by measurement tools. Apart from the obvious interest in empirical science, what I would like to focus on are their errors. We talked above about non-recognition of the input and non-execution of the instruction. In the instrumental case, generally there are no results of this type. The characteristics of the instrument and a protocol must be considered. Typically, marks of measurement are given and a protocol that tells us how to apply the tool. What happens is that each application does not always yield the same results. By simplifying things, it is possible to isolate a class of errors that depends on the application of the instrument and a different class that depends on the instrument itself.[4]

The problem is to understand what allows a deterministic processing of information, what are the acceptable margins of error regardless of the instrumental application. Let's take a meter: we can say that its description and the application protocol can be translated into a deterministic program: I can say that I read a measurement between two notches of a graduated scale: the command can be: 'read and write the value on the plus scale close to the end point of measurement'. The command appears to be deterministic in form, but the execution may not be the same by a measuring subject in unchanged experimental conditions. I mean conditions such as to exclude subjective measurement errors, assuming that the tool remains applied to the same ends of the object. However, I would like to underline the difference between the limit of an interval determined deterministically on the one hand and on the other hand measurements carried out within a certain range. Only the former counts in determining the bivalence of the measurement statement.

Between one notch and the next there is an unmarked space; observing the coincidence between the body to be measured and the interval between one notch and the other in the intermediate area, different measurements can 'read' the next or previous number. Of course, this may be done to make the execution consistent and for practical reasons it seems appropriate to do so, but this is not the point. What interests me is that on the one hand we have a deterministic system, on the

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[4] I limit myself to a few quotes: GUM (2008); Paolo Fornasini (2008); Tal, E. (2020).

other we have discordant executions. We must reflect on the discrepancy that occurs with partial information and this kind of discordance. The determinism of the device leads us to say that a certain measured body is or is not of a certain size regardless of the discordant measurements, given the extremes of a certain interval. The concept of 'true value' found in the scientific literature on measurements should be understood as the limit of the measurement range.

What happens (with a mesh) is that the extremes of the measurement range are determined and the measurement fluctuations fall within. It is important to distinguish between (not) identifying objects and (roughly) identifying within a fixed range. In the case of ambiguity a single detection interval does not exist, it is therefore not possible to identify a certain value: knowing only a person's name led to the identification of different things. In the case of measurement, on the other hand, we have deterministic information and instructions; we do not say that a thing is as we say it is, but determinism leads us to say that it must be in one way or another regardless of what we see and say. I believe that this distinction, in addition to its importance for the philosophy of science, is also important for discussions of problems of interpretation of common terms, especially vague ones (see what we shall say later on the subject).

There is an old dispute that has ended with the contenders, it concerns the problem of the foundations of knowledge. Moritz Schlick presents the Cartesian option and other theoretical positions of his colleagues from the Vienna Circle.[5] The latter believed that some form of detailed account of immediate experience could form the basis for scientific knowledge. Schlick on his part proposes to consider immediate experiences expressed in deictic sentences. As I said, the dispute ended with the fall from grace of neo-positivism. Like other old Viennese discussions, I think the interpreters preferred to pay attention to defects while neglecting the important aspects. I am thinking in particular of the characterization of the notion of truth, or, in other words, of the demarcation of the set of bivalent sentences, I mean, not with respect to or against something but simply in a descriptive-set theoretic sense. One way to see things from a human perspective is to consider a rather obvious foundation, namely that of definitions or quasi-definitions. Certainly the ostensive definitions mentioned by Schlick play an important role in language learning, at least if they are accessible to the speaker.[6] However, when we consider an image provided to recognize an object, an exhibition of an empirical detail, an initial definition of a formal system, the analogy with mechanical behavior is clearly manifest and can have a certain explanatory value. Much of the philosophical

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[5] M. Schlick (1934), pp.79.99.
[6] Cf. in particular Schlick (1936), pp.339-369. The Viennese philosopher actually has in mind an indicative act in the face of a certain experience. I would be more foundational, in a temporal sense, thinking about the introduction of the original expressions.

discussion has to do with these simple cases. The fact is that simple cases are the least frequent. Curiously, we talk about ostensive definitions or the initial baptism of an expression, thinking of establishing a fixed point from which to start (and arrive at), without seeing that the identification of an object almost never passes through direct information.

The information we receive at the time of learning can be shared, communicated, integrated, made explicit, as happens when writing in the informative part of a mesh. Learning does not end in primary school, but it is an ongoing affair: if I have to look for John, I need detailed information. Not all reports are equivalent, some information serves the same purpose, some other may be faulty and not allow identification. When I speak of identification, I am referring mainly to nouns, common and proper. However even verbs as applicable to individual things, at least some, can be interpreted in the same way as common nouns. I realize that this statement is too general and limited (to the category of nouns). I propose elsewhere to analyze a significant amount of linguistic cases by highlighting how each expression can or cannot be used indicatively and under what conditions.

A proper noun refers to a certain individual, I may have information about it, but I have, in a probably different sense, information on the fact that what it is concerned is precisely one particular thing. It is a subtle difference, but I believe it is not without importance. The letter 'a' is a certain individual thing about whom I have information as about John (perhaps in the same school period), however I also know that John is different from Martin and any other individual, while the letter 'a' despite being an individual entity, can be written differently and always be recognizable as *the* letter 'a'. What this depends on is difficult to say: in the mechanical case, programming must enable the recognizer to distinguish John individually and the letter 'collectively', perhaps allowing a topological deformation of the coded form.

We must admit a limit in the deformation of the encoded form. Of course John has changed his appearance too, but I can recognize the same individual. In this case – a subjective instance but not without importance - I have at my disposal a set of information and a transformation that preserves recognition. An objective database will be different, depending on the purposes for which it is necessary to enable a recognizer to identify John in all circumstances. It does not seem to me that the information structure alternative to the 'subjective' one is qualitatively different but that the amount of errors and disclaimers that we hope to avoid is. I no longer recognize John with the beard, I can't say it's him, but I need to know, I ask him for a document. Unfortunately, there are only a few remains of John, but I would need to know that these are John's remains, I have the DNA analysis available.

Data may be different but typologically similar, systematic errors are not entirely excluded (a document may be forged, the analysis wrong). In conclusion, an indicative use depends on a deterministic information structure that determines finally the limit values of a certain interval. We cannot have disavowals but we forget the disavowals and interference effects unless we have a particular reason to consider them. The topic deserves to be explored not so much and not only on the philosophical level as on the level of psycholinguistics and computer science. As far as we are concerned, the important thing is to have highlighted the different information structures that underlie deterministic indicative uses. A mesh allows an indicative / referential use of single expressions context free or in a true-functional context; the use is kept until inconsistencies are detected, for example due to ambiguity.

4. Language in use

By name I mean a simple expression that can play the role of a grammatical subject, names are 'John', 'salt', '10 degrees'. Expressions composed of a common name, a determining expression and possibly other adjective and propositional clauses ('every tree', 'man such that he ...') are not names, in the sense that I mean here. The latter expressions are usually assigned to the category of terms due to intersubstitutivity in grammatical contexts. We would like to draw attention to the indicative use of names, on the one hand, and on the other hand to the assertive use of sentences. However, I believe that what I will say in this regard can be extended to simple and compound expressions of the language belonging to different syntactic categories.

The phrase ''x' is name of x' expresses the relationship between use and mention of names. There are some other ways to connect names to nominees: ''x' refers to x', ''x' denotes x', 'the value of 'x' is x' (formulas that I have suggested elsewhere). These ways of speaking are not very satisfactory for various reasons. Amongst other things, they lead us to believe that there is something to which the terms refer, which does not always happen; moreover it seems that by linking 'x' and x one always speaks unambiguously, in any case. But things turn out differently than expected. The fact is that the relations expressed by the above formulas may not be uniquely applicable. If I say 'John' is John's name, there may or may not be one and only one John. Something similar happens with the instances of the definition of truth: If I say ''p' is true if p', for some 'p', there may or may not be one and only one truth value, in other words the biconditional may or may not have a specific meaning.

My opinion is that when we speak of reference and truth by uttering phrases such as ''x' refers to x' and ''p' is true iff p' we merely connect a linguistic usage and a mention. In semantics nothing more can be done than this, there is no access of some kind to a 'reality' that contains 'objects' or 'facts' that can be discovered, there is no world different from what we are talking about, a (meta) world maybe that allows us *to justify* our assertions. it is not difficult to find the reference object of 'John': it is John; you don't even have to explain why it is John.[7] That said, it is by no means a trivial problem to ask under what conditions the formulas quoted make sense, that is, to establish a sufficiently defined use of language to declare that a nominal expression refers or a sentence is true. This work on the interpretation of language is no less challenging than choosing guaranteed individual items or a 'scientific' reality to rely on.

Expressions of language are almost always used in a indeterminate way. We often talk about what they name, indicating different things: we say that 'John' is John's name, when evidently there are different bearers of the name. Similar things can be said for the instances of the definition of truth: we can think that it is true that Ulysses returns to Ithaca at the end of his odyssey, regardless of the fact that we do not know exactly what this means. 'Indeterminate' means that the information accompanying the use is lost or forgotten or has never been provided. Things can be fine anyway, we generally don't need to be too precise, we aren't when we should be perhaps and when it doesn't matter if we are. Using language to ask, pray, imagine etc. we do not need to take into account all the information necessary to identify objects and express true statements in the ordinary or scientific context. However, when we are interested in telling the truth we rely on an information structure that allows us to identify objects in a deterministic way. The fact that the instructions provided are deterministic does not mean that an object is identifiable: the program that manages the recognition of my fingerprint is certainly deterministic, but it hardly ever recognizes me: environmental factors, detection that does not conform to a certain standard, status of the detectable object etc. prevent recognition. Keeping this aspect in mind helps us not to confuse the determinism of an automatic / biological device with the execution of a recognition. An expression

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[7] One might think that what I say is classifiable as a deflationist account. This might be so, were it not for the fact that in deflation consumer goods continue to have a price, they do not come free. Notions like (in)substantial, (un)groundable, logical property or acceptance-property (Horwich (2005)) have a price that I am unwilling to pay. The kind of properties free from metaphysical residue are those whose expressions are usable in an indicative way, that is, they can be interpreted on a mesh. Therefore, if I had to choose a label I would say that mine is a *complimentary* approach regarding meaning and truth. On deflationism I will limit myself to quoting Armor-Garb (2022).

to which a determination corresponds (such as '1 meter') is the name of the limit value of an interval (i.e. of 1 meter), while approximate and error-prone measurements are a consequence of range of determination and instrumental application. Deterministic procedures allow a univocal use of the expressions to which they are coordinated. In the case of programs this can easily be achieved, in the case of instructions / routines for the use of natural terms, one can only try to achieve this result. Uniqueness is not everything: I can exploit some sets of information to recognize something like a tree (i.e. use the expression 'tree' to indicate trees) but I can remain undecided whether to call a bush a tree. We must therefore take into account the more or less wide limits of application due to the determination information. At the same time, a limit of the uncertainty interval is recognized; more precisely the information in my possession as a user of the language, or other acquired, allows me to set the limits of a recognition range, within which the determinate use of an expression may not be allowed.

For simple expressions of language and for a certain set of syntagmatic expressions there are information and procedures we follow without being aware of it. Moreover, we are able to reconstruct this complex of data and to establish a connection with natural language. This is just a reconstruction, certainly based on empirical evidence and / or some form of awareness. Another thing to keep in mind is that a mesh has objective value, in the sense that it does not correspond (only) to our private use of the term but must be such as to allow any average speaker to use that expression or that phrase in an assertive way. To some extent this happens 'a priori', otherwise we would not be able to understand one another but in declaring the criteria of use the traces of private information should not be considered unless the expression indicates something private ('I feel cold').

Given its reconstructive character, a mesh may not always work in the expected way. As an example, suppose we establish a set of information and instructions on the basis of which we expect to uniquely identify a certain thing. We attribute the deterministic character to the 'program' we wrote. However, it happens that the information is not sufficient to identify the object, or that a device is placed in front of a crossroads. As we have said this can only be problematic when we intend to make an assertive / indicative use of language, but there may be situations in which we have an assertive use in mind without being aware of what would be required to speak competently. There are, I would say, three scenarios: a first one on which the terms are used in ordinary linguistic practice; a second on which they were introduced with scientific precision; a third on which one wants to declare the truth, Aristotle would say, against sophistical speciousness. Let's start by considering the ordinary use of the terms.

First scenario: those who speak the language do not too often ask the question of whether what they are talking about is identifiable in a precise and certain way,

nor even if they can prove irrefutably the truth of their statements. This point has a certain sociological interest, we talk with friends about things ready to consult Google for more information or to be sure we have said something sound, at least when we want to be scrupulous. Facts are reported as true, there are often differences of opinion but there is always a search engine available, when one does not think that what he says must necessarily be as he says it is. I am obviously not talking about moral or aesthetic opinions for which there is no objective way or procedure, either a priori or a posteriori, to decide who is right. This latter issue is not without interest, as it proves that concepts such as *beautiful*, *good*, *wise*.. have been introduced in an approximate and scarcely shared way and for this reason it is quite useless to try to reconstruct the lost information.

O**n the second scenario** the terms are introduced in scientific practice. The introduction is shared and codified in written texts, so that the use of terms is univocal. In this case it is not a question of reconstructing a set of partial or implicit information, but simply of going to read what is written in some textbook. On the other hand, not all things are so simple. For example, concerning the disciplinary field it may happen that expressions of a scientific language in sub-fields receive a different informational content, 'parallel lines' is an example but others can easily be found. The concepts of physics are defined instrumentally according to a protocol, and this seems the best that can be obtained when looking for a determination. On the other hand, the tool is intended to be integrated with the observer, there is an observer before, during and after the application of a tool. The observer has his own protocol, which is apparently simple: he perceives and certifies on the basis of his sensory apparatus.

O**n the third scenario** we find ourselves in the agorà discussing with Gorgias: we are philosophers and we would like to convince our sophist interlocutor that there are not as many truths as there are opinions expressed. Philosophers aside, telling the truth is not just a way of self-gratification, it is part of social practice and allows us to interact effectively and efficiently with our fellow men. The question that must be asked is: when I want / have to tell the truth, what does it take to use expressions correctly and to construct a speech appropriately? The witness says he is telling the truth, where is the evidence? Unfortunately, this scenario has produced only a background awareness in philosophers regarding the conditions of identification and truth. We have preferred to look at how to justify alleged true or reasonable assertions on the basis of some metaphysical theory. Apparently this kind of attitude does not belong to the past only but interests most professional philosophers.

A way of placing one's business in the third scenario has always existed in reality; it consists in placing the philosophical analysis of language at the center of atten-

tion. From our current point of view, what we should do is reconstruct the information context in which we are justified in making an assertive bivalent use. We do not generally need to specify a mesh, we implicitly use incomplete information without scruples or comparing it with those in the possession of others. However, when our purpose is to uniquely indicate something or tell the truth, if we take this task seriously we must begin by associating appropriate information with the individual components of the sentence and then see how they can be combined with each other in correspondence with the syntactic composition. What we do is establish a link between information and expressions, we can say that we project the information structure onto the linguistic one.

Determining simple expressions is not too problematic, it involves giving a set of information that allows one to use an expression in a unique way. But there are relatively few simple expressions; proper names aside, incomplete sets of information are contained in the space of a vocabulary, a material that can be worked on. One problem may be that of comparing different structures of determinations: in retrospect it can be said whether different ways of giving information serve the same purpose. With compound expressions, things change, there is no path outlined and often one has to decide on a case-by-case basis. Expressions composed using syntax rules rarely have a compound mesh structure. In composing the expressions of a semantic language we encounter two main problems: the discrepancy of scope and of the routines on the basis of which we access information.

If we limit ourselves to considering the disciplinary field, it may happen that the compound *indicative* expression does not exist because the fields are disparate or it exists regardless of the non-coincidence of the fields. A syntactic non-indicative compound of the first type is 'Henry's square root' (mathematical vs empirical field), an allowed composition of the second type is 'drawing a triangle' (empirical vs mathematical field). In the first case we are unable to use the sentence to tell the truth, in the second we should be. A fairly simple way of getting out of difficulties may seem to see things from a set-theoretic perspective. We associate sets to expressions and we get the empty set for compounds such as 'Henry's square root' or the value *false* for simple sentences such as 'Henry is the square root of 4'. A translation into a logical language makes things simpler (or simplistic) by eliminating the information component on the one hand and ensuring a 'Curry-Howard' correspondence on the other.

5. Casting the net

Allow me a curious example taken from mathematical literature: 'It has been sug-gested ... that the functor $\mathfrak{I}$ (= interpretation) may be used for catching lions: write the lion's name on a piece of paper and then apply $\mathfrak{I}$, having first made sure that the paper is inside a cage'.[8] The example seems to me worthy of attention not only for the humor: the lion is the value of the interpretation function for the 'lion' argument, it is also what we are talking about by using that nominal expression. For not interpreted logical languages, we most often have to deal with models in which the functions are built on a numerical domain or in any case on a domain whose elements have a name in 'use'. An example for theories of the first order is the logical axiomatization of groups, assuming the set of natural numbers as the domain of the model and interpreting the non-logical predicates as operations on the domain.[9]

Natural language expressions can be interpreted by assigning mathematical objects expressed in a mathematical language interpreted or not, or by using (as in the example above) the same terms of natural language: 'lion' stands for lion; this second use is prevalent in linguistic and philosophical semantics. A first problem arises when we try to match the expressions used to those mentioned. How should we understand the domain of interpretation? Does it contain all the things we have a proper noun for? All the things we have a noun for? Anything that in principle we could point to with a finger? Which occupies a certain space-time region? Etc. Assuming we have a solution for all these problems (even neglecting ontology), what about Fregean concepts?

I call *semantic language in use* the language that expresses the possible 'meanings' of the expressions of the syntactic language to be interpreted. Only two examples: 1) the syntactic language is the natural language, LSU coincides with the syntactic language, thereby expressing all possible meanings, including fictitious entities and contradictory circumstances; 2) LSU is the language of a typed lambda calcu-lus, it contains all the translations of the expressions (of a fragment) of the natural language and additional expressions such as 'the true', 'the false'. Somehow LSU expresses more than what Wittgenstein called the totality of facts: it expresses the totality of what we can talk about 'in translation'. Function **I** associates in a given instant to pairs <expression, mesh> an element x- *intended according to the infor-mation specified in the mesh*, corresponding to the LSU expression '*x- intended according to the specified information ...*'.

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[8] Lambek (1988), p.312.
[9] I drew the example from Mendelson (1964), p.71.

Frege's idea of considering the meaning of the predicates as functions from the domain (product) to the set of truth values requires only one domain on which to define all predicates, we can imagine this domain as the set of all the things we can talk about, or the totality of entities, in some sense. If what we have said in the previous paragraphs has any value, then in order to use the expressions of the language in a semantic model in an indicative way, a certain informational structure must be associated with them. Such a structure accepts only certain inputs, it can be said that in some way it determines its own domain, which means that the composition of expressions does not generally correspond to the composition of functions defined on a single domain. If we want to maintain the ordinary semantic approach, it is necessary to assign independent domains to the predicates and consider their union.

The problem of the domain is related to that of compositionality and logical form. Considering a certain set of natural language expressions and their translation into the language of predicate logic, one may wonder what atomic and molecular formulas express. Assuming that a predicate is adequately defined on its domain of reference (which from our point of view means associating a mesh with it), we can expect it to do its job in an atomic statement: at a certain input it associates a truth value. The type of translation of molecular sentences is such as to make the problem of the composition between atomic sentences insignificant, that is, whatever the truth values assigned, the value of the molecular formula can be calculated. This is a point on which we must dwell.

Combining the domains on which F and G are defined does not mean being able to give meaning to a formula of predicate logic, from the point of view we intend to support here. Let's take the statement 'all men are toxic liquids'. If 'man' translates into λx **man** (x) and 'toxic liquid' into λx **toxic liquid** (x), the formula λx. **man** (x) $\wedge$ **toxic liquid** (x) makes sense if we have established that the domain is given by the union of inputs recognizable as men and toxic liquids. This leads a device programmed on the basis of the information structure not to recognize a certain amount of toxic and human inputs, that is, once the recognition of a man has been carried out, the information is not exploitable for subsequent recognition, the two recognitions occur in parallel and are mutually exclusive. However the same formula remains true functional for recognizable inputs. I mean: apart from verification, it makes sense to associate a truth value. Those who accept a logical analysis of language in Russell style and a Fregean (-type) semantics must expect this situation.

What seems to me worth asking is: 'do we want to attribute a truth value to statements like 'all men are toxic liquids'? I mean: we understand the statement, we can make a metaphorical use of it, but would we use it to make an assertion? There is no single answer in fact. I think the situation is in some respects similar to that

of defining the conditions of use of a logical connective, for instance implication: strict, material, connective, linear... We do not ask ourselves which use is to be preferred, in reality we make all uses. Someone reading the strange example about men and toxic liquids might think that taking a man it makes perfect sense to assert any inappropriate predicate, the result is not nonsense but a false sentence. A test conducted specifically by me on a class of students did in fact yield this result, presenting cases of growing nonsense, most of them continuing to tick 'false' rather than 'senseless'.

However, it is legitimate for a person to think that the above sentence, or others like 'John is a square root' are meaningless. Who is right? I would be inclined to answer both. The problem is not to establish whether it is permissible to use assertively indeterminate phrases but how this happens, in other words, what is the logical form that we are implicitly considering. The predicate logic option is only one among many; it is not an invention but a certain use that has a connection with the ordinary one. So how could we account for the ordinary use that does not allow us to put together discordant predicates? One possibility is to place restrictions on the compatibility of the predication domains and on the routines in the meshs associated with language expressions. When we think of numeric functions it is completely normal to define a scope of definition: if we consider the set of natural numbers N, the subtraction operation will for example be defined on a subset of NxN.

In the case of a simple categorical sentence, the semantic device we are sketching has to provide for the assignment to the simple term (determiner plus common noun) and to the predicate (F) of two information structures that allow the identification of a certain number of objects. A coarse logical form could be QUANT.N + F. A device that performs the assigned task of identifying N has no instructions to identify 'in parallel' things that are not N. The order of the expressions in the categorical scheme matters: the recognition of N (first predicative letter required) occurs on the basis of the information structure of N itself. The information structure of F must be compatible with that of N, in other words F must be recognizable as N (e.g. philosophers must be recognizable as men even if there are no more philosophers or men).

For each term used indicatively, an associated mesh allows the identification of what the expression indicates. In the composition it is necessary to understand if and how different routines can 'add up', in some sense.[10] We are aware of the fact that routines with different targets of a VP and an NP cannot always be 'added'. This must be taken into account. What we do not know (and it is not the task of

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[10] The detection interval for a mesh with empirical routine is established at the time of learning the language. It is something objective; so in cases such as that of toxic liquids vs men, for us it is objectively impossible to specify a mesh empirically.

semantic analysis to establish) is whether there are things to which a term is applicable, or in other words what is the scope of definition of a predicate at a given moment. There are therefore two reasons why a semantic composition could be blocked: one is the sortal compatibility of the expressions and the other (of which we cannot have knowledge) is if - speaking in functional terms - a certain argument assigned fails or not at the moment of interpretation in the range of the assigned function.

What is a semantic system that can be used to give shape to the semantic ideas previously outlined? We would like to preserve some form of compositionality; at the same time, the intuition that entences with disparate terms are the subjects, as Aristotle says, of poetics and rhetoric, as being not endowed with truth value. I believe there are reasons that make a categorical semantics preferable. The particular semantic structure proposed for example by Lambek, a TOPOS, has the advantage of suggesting a typed lambda calculus as internal language.[11] To account for the differences in meaning and interaction of expressions, a dimensional factor must be added: types will have a mesh dimension so that the ordinary isomorphism between semantic and syntactic types should be understood as forgetting the mesh structure. Obviously this aspect and more generally categorical-dimensional semantics is a complex job for the future. The same can be said for many intriguing philosophical problems such as those concerning intensionality, fictitious entities and vagueness.

While not going into the merits of the topics listed above, which would require a detailed analysis, due to the substantial literature, I would like to say something about the general criteria that I would follow in addressing these topics. To address the problem of vagueness and names of fictitious entities it is necessary to start from a consideration of the way in which speakers regard the truth of the sentences containing these terms. Besides one can think that a noun in subject position or a predicate requires some form of acceptance of a set of corresponding objects. It has often been considered a question of choosing which objects or sets of objects to accept, in the current world or in a presumed possible world. From my point of view, things are very different.

If we want the formulas "a' identifies *a*' and "p' is true if p' (where 'p' contains an occurrence of 'a') to make sense, we need to establish what information allows a device to uniquely identify *a* or to accept 'p' as true. Somehow what trivially happens is that we find or put ourselves in a position to find what we are looking for: if I consider that the associated information is textual and the procedure requires me to check in a book, what can happen is that the sentence is or is not written in

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[11] In addition to the Lambek article just mentioned, among other available studies Lambek - Scott (1986); R. Goldblatt (2006) can be consulted.

the book. The same for the specification criteria for common nouns: the detection can be done within a certain interval, possibly on a probabilistic basis. Specifying information and procedures we model a certain portion of reality. No information is created or supposed beyond that applied in order to find something.

We are short-sighted if we think there are isolated expressions provided with isolated meaning: what matters is the expression together with the information and the procedure specified in the mesch: I am able to identify a unicorn even on the basis of information obtained from an image in a mythology book. I will say 'here is a unicorn' looking at a picture. There is no name like 'unicorn' taken in isolation to which a certain object should be associated (against all the baroque constructions of intensional semantics); there is the name *together with* the information and the procedure that establishes when and where I can say 'here is a unicorn'. If a different procedure requires finding the unicorn in the real world, the statement 'there is a unicorn' is sound but false, unless somewhere there really is a unicorn resembling the image given to me.

What can be said about this approach to truth in general? For one thing, there is a sense in which the meaningful expressions of language can be interpreted (according to information structures). For a certain interpretation, the nominal expression 'oak' is the name of the oak. At the same time, a propositional expression is true / false for some compatible mesh interpretations. If you want to speak in terms of reference, a simple expression has reference if it can be used assertively to indicate something identifiable based on its interpretation, and an expression can be used assertively if the information structure is deterministic. So the weight of the reference bears on the determinism of the structure. Determinism is an objective property of information structures, the application of a name to things is an act by a user, it could be dysfunctional or even not exist. When the act is in accordance with the instructions and based on the information, a unique result must be obtained, when available.

So if there is truth, there is determinism, there are indicative uses. But in many cases we do not have certainty about the information structures; we can reconstruct the information we think we have available but the reconstruction or construction (in a program) is supposed to have a deterministic value. We can build a net and know that fishing depends on the net being well built, but it may happen that there are faults in the construction of the net. We don't have to look so much at the fish that we can't catch, if we don't need to, but rather at the dysfunctional use. When I interpret the name 'John Smith' according to a certain information structure, i.e according to a mesh, and I find two John Smith's, in retrospect I can say that the structure was not deterministic, that is, it did not allow an informed user to identify one and only one object and to speak of it in a non-contradictory way.

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