

Inferentialism and communication: language and the code table problem

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1. The 'code table problem'

Everybody who has paid any attention to codes and code breaking (an excellent introduction into these issues is Simon Singh's *The Code Book*), will be acquainted with what can be called *the code table problem*:






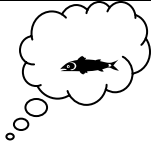
To communicate via a code, we need a code table. But to be able to agree on a code table, we need to communicate.

This, of course, is not a problem if the communicating parties are able to meet and fix up a code table (communicating without using a code) prior to entering the environment where coding is necessary. (Thus, if two groups of soldiers are being sent into an enemy's rear, they can agree on a code table before deployment and then use it securely in the field.) However, if the parties are in the environment from the beginning, then the problem is acute. (This is the case when two groups of soldiers become separated in the enemy's rear without having agreed upon a code table in advance; or when I want to use a code to send my credit card number to a seller I have never met and who is based in some distant land.)

There is an ingenious solution to this problem: namely the separation of the encoding and decoding tables. If an encoding table can be devised so that it cannot be used to work out the corresponding decoding one, then I can send everybody the former, keep the latter for myself, and thus become the sole person able to decode the messages encoded for me by others. That this is now possible is one of the greatest achievements of modern cryptography.

Some say that language is a code; and also that a version of the code table problem applies to it. But we must be careful to assess in which respects the situation is similar to the previous one and in which it is different. Those who say that language is a code usually mean that words are to their meanings as codes are to the words they encode. Hence, if we can depict a real code in the left of the two tables below (the particular code consists in shifting each letter two positions forwards along the alphabet), then we could imagine the 'code of language' as in one of the following two tables (depending on whether we take words to encode directly real entities, or rather our ideas thereof):

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| | | | |
|------|------|--|--|
| dog | fqi |  dog |  dog |
| cat | ecv |  cat |  cat |
| fish | hkuj |  fish |  fish |
| ... | ... | ... | ... |

Note that while in the first of the three cases we do not really need the table (but rather only the rule that underlies it), in the other two cases the table is indispensable, for there is no such underlying rule.

We need the code of language, so the story goes, because what we can exchange within the process of communication are specific kinds of items (sounds, inscriptions, gestures) and to get other things 'into it' (i.e. to get them referred to or talked about) we must encode them by means of these items¹. Hence the point of this kind of code, the story continues, is not to make a communication channel unintelligible for outsiders, but rather to establish a communication channel at all. We do not care whether our messages will be overheard by outsiders, we care how to make it intelligible for the receiver. And this essentially changes the code table problem: it is no longer the problem of how to communicate a code table secretly without already having one, it is how to achieve a code at all.

2. Whence the code table of language?

Let us look at some examples of people who look at language as at a code. The philosopher and logician Pavel Tichý (1992, p. 70) writes:

A language is a system of visual or audial signs, each of which *means* something or other. The advantage of having such a system is that we can make our thoughts

¹ Let me remark that the defenders of the code conception of language are usually less radical than the pundits of Lagado in *Gulliver Travels*, who insisted that "since words are only names for things, it would be more convenient for all men to carry about them such things as were necessary to express a particular business they are to discourse on"; which, as Jonathan Swift tells us, "would certainly have taken place, to the great ease as well as health of the subject, if the women, in conjunction with the vulgar and illiterate, had not threatened to raise a rebellion unless they might be allowed the liberty to speak with their tongues".

accessible to our neighbours. If we write or utter words which, in a given language, have the appropriate meaning, then anybody who is familiar with that language, and cares to read or listen, can see what's on our mind. ... A grammar of English is a system which determines which English expressions are well-formed and what each of them means. In other words, it is a generator of expression-meaning pairs.

How does such a "code of language" come into being? A dismissive reply often aired in the literature is *by convention* (with an indication that the nature of the convention is not an interesting matter); but on closer scrutiny, this is no real answer. The term "convention" is ambiguous; and it is obvious that if we are to consider this answer seriously, then we cannot take the term in its most straightforward sense, namely as referring to an explicit agreement.

That language cannot be the product of convention if we understand convention as something explicitly agreed upon, has long been clear. Already Bertrand Russell (1921, p. 190) remarked that "[w]e can hardly suppose a parliament of hitherto speechless elders meeting together and agreeing to call a cow a cow and a wolf a wolf". Donald Davidson (1984, p. 280) articulates the objection to the conventional foundation of semantics in a characteristically laconic way: "Convention is not a condition of language ... The truth is rather that language is a condition for having conventions".

But those who insist that the foundations of language *are* conventional need not be too impressed - they might admit that what they have in mind, of course, is not *explicit* convention, but rather convention that is in some sense 'implicit' or 'tacit'. No clear account of this existed until David Lewis (2002) seized the challenge by the horns and explained what precisely might be meant by 'tacit convention'. Drawing on game theory and on the emerging social-scientific theories based on applying game-theory to human affairs, he provided an account of how people can converge on a common code table not by explicit agreement, but by solving certain coordination problems.

Hence a shared code table arises, according to Lewis, as an equilibrium of a coordination game. Speakers converge upon a shared code table by means of a certain spontaneous process; but the existence of the individual code tables is simply taken for granted. However, should we not start the explication further back? How do individual speakers come to have code tables available for coordination in the first place? Does each have a language and the only problem is making them the same?

One approach to these questions relegates them to biology, specifically neurophysiology. The assumption is that we must have some kind of in-built code table – or at least some kind of a blueprint for it – in our brain. This seems to be the standpoint of Chomsky (see Chomsky and Rivano, 2000, p. 186):

I think there is by now overwhelming evidence that there is a distinctive faculty of language, FL, one of the many modules of mind/brain, with its own specific properties. I'm taking a 'language' L to be a state of FL. L generates an infinite set of expressions EXP, each a structured complex of representations of sound and

meaning, let's say a (PF, LF)² pair, 'representation' of course not having the connotations of the philosophical literature and its special usage -- there need not be anything (and indeed, there apparently isn't anything) "represented" in the sense, say, of theories of ideas.

How did such a 'code table' materialize in our brain? Chomsky does not think there is much to be said about this; as far as he is concerned, it could well have been some great casual mutation. But this is very improbable and most of the theorists of evolution balk at such a proposal.

What is the table good for? Why do we need to codify logical forms as phonetic forms³? Are logical forms 'messages' that we need to get, by means of phonetic forms, across to other people? It is quite cumbersome to assume that we have messages, i.e. some relatively self-contained pieces of information, in our brains, before we have the capacity to convey them to anybody. Despite there being philosophers of mind and cognitive scientists who believe that we are born with a 'language of thought'⁴, I side with those who believe that, on the contrary, it takes language to get thought packaged into such units⁵. Hence I think the idea that each of us has developed a code table because he or she needed to let his or her peers know about his or her thoughts is putting the cart before the horse - language and thoughts in a communicable packaging are two sides of the same coin which must have co-developed in mutual dependence⁶.

Anyway, it seems to me that if we want to see language as a code, then the key problem is not a coordination of code tables, but rather the very emergence of something like a code table. Why should our mind come to contain anything like this before we start to try to communicate?

² Though Chomsky does not state this explicitly in the text quoted, 'PF' and 'LF' obviously stand for 'phonetic form' and 'logical form', respectively.

³ I have challenged the very concept of logical form elsewhere - see Peregrin (2010).

⁴ Here the reference point is, of course, Fodor (1975).

⁵ See, e.g., Dennett (1991), who claims that it is the development of language and connected social interaction what makes the parallel processor, which our brain essentially is, implement a "von Neumanesque" machine, thus making it into "a serial processor with a succession of definite contents".

⁶ Clark (1998) writes: "The role of public language and text in human cognition is not limited to the preservation and communication of ideas. Instead, these external resources make available concepts, strategies and learning trajectories which are simply not available to individual, un-augmented brains. Much of the true power of language lies in its underappreciated capacity to re-shape the computational spaces which confront intelligent agents."

3. Language and evolution

In the above quotation, Tichý indicates that the key task accomplished by the code table is the communication of thought. He is far from alone in thinking so (and of course, it sounds like common sense). Until we have language, we are solitary beings imprisoned in our inner worlds, but once we manage to make our thoughts public, we come to inhabit the intersubjective worlds of our communities. Consider what Searle (1979, pp. 193-4) says about this topic:

... imagine a class of beings who were capable of having intentional states like belief, desire and intention but who did not have a language. What more would they require in order to be able to perform linguistic acts? Notice that there is nothing fanciful in the supposition of beings in such a state, since as far as we know the human species once was in that state ... The first thing that our beings would need to perform illocutionary acts is some means for externalising, for making publicly recognisable to others, the expressions of their intentional states. A being that can do that on purpose, that is a being that does not just express its intentional states but performs acts for the purpose of letting others know its intentional states, already has a primitive form of speech act.

This clearly presupposes that we have thoughts ready to be made public before we have language.

How did thought, in the form of separate meanings or logical forms, which fill in the left column of the Chomskian or Searlian code table, develop? It seems plausible to assume that the actions of communication evolved out of actions in which an organism simply tries to influence its environment: to get something to eat, to evade danger etc. Here is one of the possible, and by my lights, plausible, stories, due to Krebs and Dawkins (1984):

The fitness of a creature from the viewpoint of natural selection obviously increases with its ability to predict the behavior of its environment; including its living environment, i.e. other creatures. Hence it is to be expected that evolution will produce creatures that will be able to "read minds" of other creatures, i.e. predict what these creatures are about to do. (Of course, the term "mind reading" is used metaphorically – neither the reader, nor the creature being read must have anything that we would call a mind. The point is just that evolution molds the creature into the shape where it behaves *as if* it read the mind of the other one.)

Now, as creatures compete, any enhancement of fitness tends to prompt a countermeasure. The countermeasure that emerges here is what Krebs and Dawkins call "manipulation". A creature whose behavior is being predicted (whose "mind" is being "read") would take advantage of this fact and would use the advantage to manipulate those who read its mind. The predicting produces a situation in which some hints in the behavior of the predictee lead to a certain reactive behavior of the predictor, who is awaiting the given behavior of the predictee. Hence the predictee might 'tease' the predictor into displaying this reactive behavior by displaying the relevant hints; and in this way it can manipulate it.

Escalation of these 'arms races', according to Krebs and Dawkins, may lead to two different outcomes, according to the nature of the emerging manipulation. If the manipulation does not accord with the interests of the manipulated, then of course the counter-countermeasure of the manipulated is to stop taking the hints seriously; as the result of which they keep working only with higher and higher energy investments until they become completely unusable. If, on the other hand, they do accord with its interests, the hints can gradually reduce to a total minimum, which Krebs and Dawkins call "conspirational whisper" (thus becoming what someone might want to call 'symbolic'). And this, they claim, is the kind of signaling that constitutes a rudiment of language.

Can this kind of signaling lead us all the way to human language? Does it make room for *meanings* of the kind possessed by the words of our various human languages? An objection might be that this model of communication does not involve any representing or encoding, and hence nothing like meaning if we construe meanings in terms of the code table. No messages are encoded or decoded, for what is going on is merely direct impingement of one creature upon another.

However, it would be shortsighted to dismiss this model of communication as different from what we people do when we use language merely on the basis that it involves no code table. Maybe, seeing our communication in terms of coding and decoding is not appropriate, despite our tendency to see it as almost self-evident. After all, when I say "Good morning" to somebody, this seems to be more reasonably describable as a kind of impingement (serving the maintenance of friendly inter-human relationships) than as a case of passing him a piece of encoded information. And many philosophers of language (including most pragmatists, and the later Wittgenstein) insist that words are far better seen as tools for accomplishing multifarious tasks over and above representing or encoding.

4. Communication as impingement

The perspective sketched in the previous section need not mean a loss of meaning – for meanings resurface as 'functionings', becoming the ways in which individual expressions are employed, or come to be employable, within linguistic practices. This is what was urged by Wittgenstein (1969, §64): "A meaning of a word is a kind of employment of it. Compare the meaning of a word with the 'function' of an official. And 'different meanings' with 'different functions'". This has led to the now well-established tradition generally described as the *use-theory of meaning*.

However, there is obviously a grave difference between the kind of signaling we can imagine as arising directly from the mindreading/manipulation arms races, on the one hand, and what we humans do with our language, on the other; and there is also a significant difference between the meanings involved in the former and those involved in the latter. We usually say that we humans, unlike signaling animals, make judgments, express propositions and employ concepts. What further ingredient is needed to move the simple communication

practices resulting from the mindreading/manipulation interaction to the level characteristic of human linguistic intercourse? What makes the difference if not encoding?

Here is where *inferentialism* may enter the picture: it states, roughly, that what gets us from simpler practices like signaling (involving meanings only in a metaphoric sense) to the practices involving meanings in our fully-fledged human sense, is *rules* and especially the rules of what Brandom (1994) calls the *game of giving and asking for reasons*.

How can rules make a crucial difference here? A short answer is that they make functionings into roles *vis-à-vis* rules; and it is these roles which are what in fact we call meanings. The standard model of this is chess: it is rules that transform the tokens we use within the game (the pieces of wood, or ivory, or whatever we push along the chess board) into the denizens of the world of the game (such as pawns, rooks or bishops); and it is supposed to be rules that make the sounds we emit into words meaning this or that⁷.

What is the difference between a shriek aimed at waking one's pal and claiming "It is morning!" (which might be used to the same effect)? The idea is that just as moving a chess king is not merely changing the position of a piece of wood, but an action within the space of a chess game constituted by the rules of chess, the shriek in question is not merely a shriek, but rather an action within a specific space constituted by the rules of language, an action that we call meaningful pronouncement and that is impossible outside of this rule-constituted space.

There is a lot to be said about the very specific space in which we can make *claims* and *assertions* (it is the space constituted by the rules of the *game of giving and asking for reasons*). The idea is that the distinctively human kind of meaningfulness (in connection with which we speak about propositions or concepts) arises from the mold of this very space. Hence, concepts and propositions are specific kinds of roles conferred on our sentences and words by means of a very specific and very complex edifice of rules.

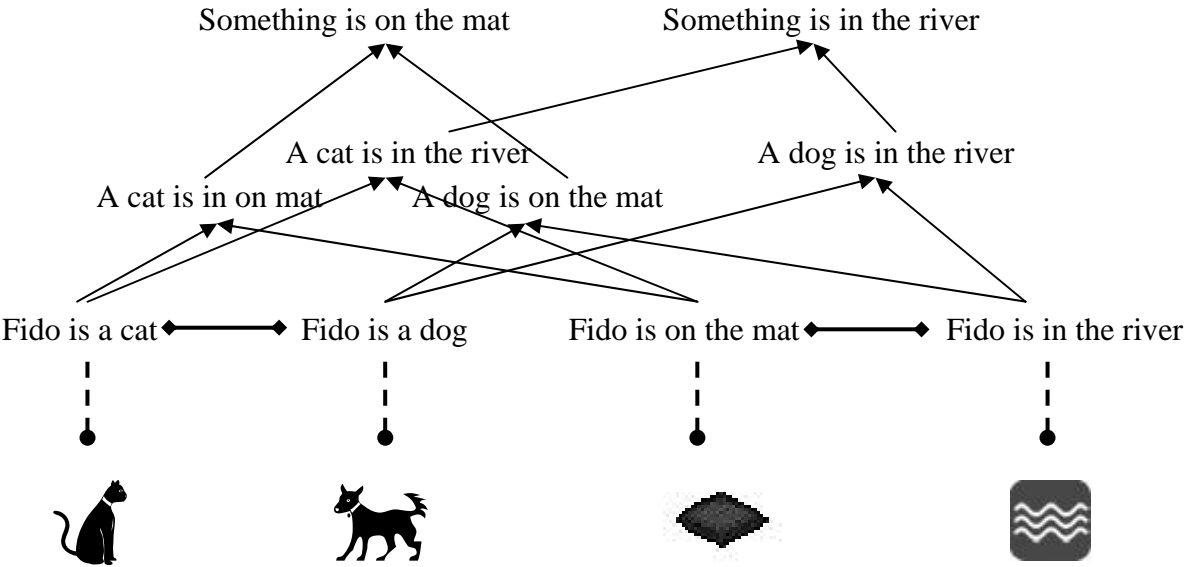
But what about the persistent impression that when we tell somebody that Fido is on the mat, there is an intimate relationship between the utterance and the part of the world constituted by Fido the dog and the mat in question, consisting in the utterance somehow 'expressing' or 'representing' or 'encoding' the situation? If we switch to our 'game-theoretical' view of language, how will we account for this obvious 'hooking' of the language onto the world? Well, the link is accounted for as consisting in some prominent role the piece of the world plays *vis-à-vis* some of the rules governing the sentence (and hence also governing the words it consists of); e.g. the fact that it is correct to assert the sentence if and only if Fido is on the mat. Hence a 'hooking' is still there, the inferentialist only refrains from portraying it as a kind of representing or encoding.

However, if language were a matter of merely rules along the lines of *Assert 'Fido is on the mat' only if Fido is on the mat*, then it would fail to significantly exceed the boundaries of a stimulus-response account of language, which is notoriously incapable of accounting for the complexities of human linguistic practices. Inferentialism stresses that the key rules that must

⁷ See Peregrin (2006; 2008).

be involved are *inferential* rules, rules of the kind *if it is correct to assert this and this, it is correct to assert also that*. Only this kind have the capacity to bludgeon language into a construct with sufficient complexity to give birth to concepts.

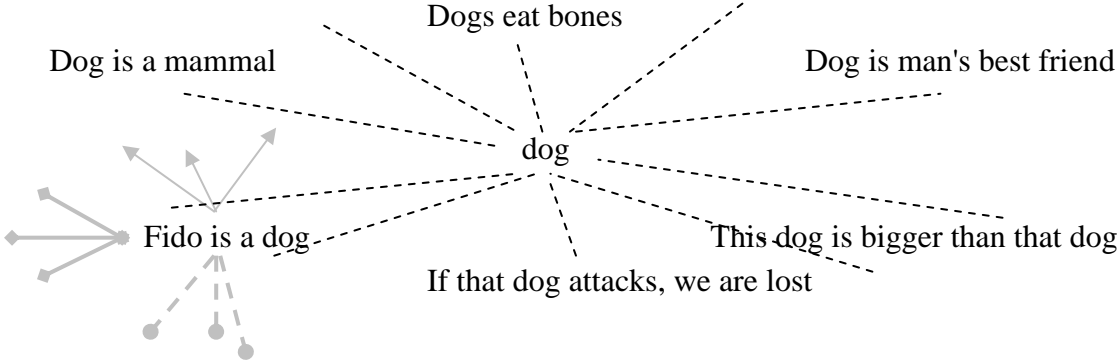
In this way, language spreads out into a vastly complex structure constituting a vastly complex space of potential positions, and it is these positions that are plausibly called propositions, concepts etc. The proposition expressed by the sentence *Fido is on the mat* is neither a piece of the outer world, nor a chunk of a mind stuff glued to the sentence: it is rather a position in the normative structure arising in the intersection of the vertices connecting the sentence with the world (*It is correct to assert 'Fido is on the mat' only if Fido is on the mat*) and vertices connecting it to other sentences (*If it is correct to assert 'Fido is on the mat', it is correct to assert 'Something is on the mat' or If it is correct to assert 'Fido is on the mat' and it is correct to assert 'Fido is a dog', then it is correct to assert 'A dog is on the mat'*). We can depict a very small excerpt of this web around *Fido is a dog* as follows (arrows represent the relation of inference, lines of the form $\blacklozenge\longleftrightarrow\blacklozenge$ represent the relation of incompatibility, and those of the form $--\bullet$ a normative interconnection of a sentence with a situation, i.e. the rule that a sentence is correctly assertable iff the situation obtains⁸):



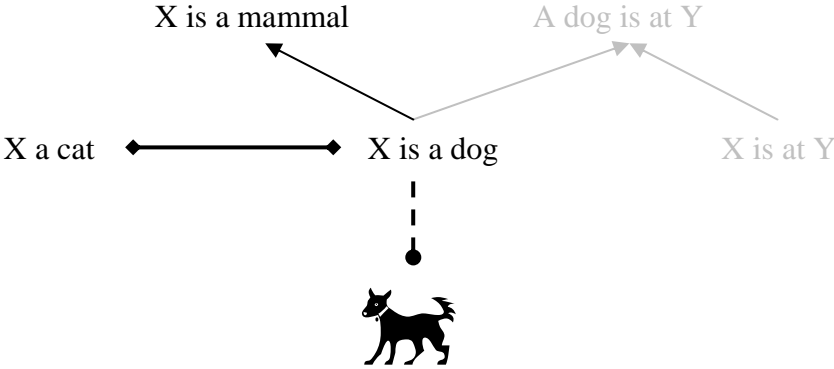
And the concept of a dog is also not a piece of mental or other stuff interconnected (perhaps by a relation of intentionality?) with dogs, it is rather a position in the structure arising in the intersection of the vertices created by the containment of the word in various sentences and consequently the vertices in the intersections of which are the sentences. (Thus the concept is also an intersection of various links of the many sentences containing a word expressing the concept to the world, e.g. the sentence *This is a dog* or *If that dog attacks, we are lost* or *This*

⁸ Do not pay much attention to the pictures used to symbolize situations. They are just unimportant icons.

dog is bigger than that dog.) In the following picture, the dashed lines symbolize the relation of containment by which the word is connected with all kinds of sentences, each of which being related to other sentences and to the world in the ways exemplified in the previous picture.



Of course, to understand the word we do not necessarily deal with or envisage the vast (if not unlimited) number of sentences in which the word can feature. The interconnections are mediated by rules and patterns: to understand the word *dog* does not mean to envisage all the inferential links of sentences like *Fido is a dog*, *Lassie is a dog*, *Goro is a dog* etc. to other sentences, it consists in accepting general rules such as those linking *X is a dog* with *X is a mammal* as a premise and a conclusion, and *X is a dog* with *X is a cat* as incompatibilities. Many more inferential links featuring *dog* arise out of the interaction of these patterns with patterns more closely associated with other words: for example the pattern linking *X is a Y* and *X is in Z* with *A Y is in Z* as premises and conclusion, which have to do with the semantics of *is* and perhaps of the infinite article and of the preposition *in*, yields us the link between *X is a dog* and *X is in the river* with *A dog is in the river*.



Given this, is it possible to see language as a code? Well, is it possible to say that a particular piece of wood *represents a pawn* or *encodes pawnhood* (instead of that it *is a pawn* or *plays the role of a pawn*)? It is an odd way of talking, but if there is no misunderstanding likely, then we can say it. And in the same way, we can say that language is a code – if we

keep in mind that we are not thereby saying that language arises from some preexisting language-like stuff that we would encode by means of our overt language. Talking about language as a code make sense provided we admit that the code table of language co-evolved with our linguistic practices and hence with language itself, as in bootstrapping.

The perils of normativity

To summarize: the claim of inferentialism is that linguistic items become what they are (and hence possess what we call *meanings*) in force of being caught up within the network of rules (especially inferential rules) just as pieces in chess become what they are in force of being caught up within the network of the rules of chess. Meaning is not a thing, it is a role. (Of course, there is a sense of *thing* in which also a role is a thing; but the important point is that roles are in a certain sense not self-standing, unlike things in the narrower sense of the word they presuppose something that can instantiate them.) Communication is a matter of establishing the normative *space of meaningfulness* (which, from a certain angle, might appear as a matter of 'coding'), which underlies our ability to produce meaningful utterances (just as the space constituted by the rules of chess underlies our ability to check, castle etc.). Hence, what characterizes specifically *meaningful* expressions, from this viewpoint, is not their being some sort of representations, or displaying intentionality, or encoding information, but rather their being entangled within a certain tremendously complex web of inferential relationships, relationships that come into being as we humans become social creatures displaying certain complicated behavioral patterns.

It is important to stress that what inferentialism is primarily about are inferential *rules*, not inferences as actions of speakers ('inferred' done in their minds/brains). Inferentialism has very little to do with the sense of "inference" in which we use the term when talking about the distinction between inferential and non-inferential knowledge. (This distinction concerns the difference between the pieces of knowledge that we gain directly or immediately by perception, and those gained by inference from other pieces of knowledge we have.) Also, inferentialism is not concerned with the sense of "inference" which the word has within discussions of speech acts (concentrating on the distinction between what is directly communicated and what is merely implied). Again, inferentialism is not primarily concerned with the mechanisms by which speakers/hearers 'encode/decode' information.

Thus, inferentialism of the kind discussed here should not be confused with various kind of theories according to which the meaning of a sentence is its role *vis-à-vis* the inferences we actually tend to do, within our minds, in connection with the sentence. This last kind of theory stays on the level of meanings as functionings, which we have abandoned in favor of adding normativity and replacing functionings with roles.

Of course, the acceptability of this normative variety of inferentialism heavily depends on the sense we are able to give to the concept of *normativity*. For is it not simply a too

mysterious unexplained explainer? It does look this way, at least insofar as it is not something readily graspable and accommodable within our usual picture of things. The mysteriousness stems from the fact that normative realms, such as the space of meaningfulness, seem to be something intangible, which, nevertheless, endows us humans with certain new powers, which are not causally ineffective.

Here it is important to stress that normativity is not an *unexplained* explainer. True, it is the case that normative claims, claims to the effect that something is correct/incorrect, or right/wrong, are not translatable into descriptive claims about the 'normal' world; however, this is not because they would describe some esoteric realm over and above the 'normal' world, but because they are simply kinds of utterances which are not (entirely) descriptive. The specificity of us humans is that we take part in *creating* our world; and normative utterances not only respond to what there is, but also take part in the constitution of the world: they help build, sustain and rebuild it. Meanwhile, there is always the option to elucidate normativity by means of analyses of the concept of rule, of accounts of how rules can come into being within human communities, and listing the aims being served by the normative utterances⁹.

Chess is certainly not mysterious, neither is the fact that a piece of wood may become a 'pawn', and may become it because we people subject it to certain rules. The essential differences between chess and language can be summarized in three points:

(a) Language is more of a sport (like football) than a game (like chess), because many of its rules involve the extralinguistic world. But in view of the unproblematic existence of sports this does not seem to be a too problematic feature¹⁰.

(b) The rules of language are mostly implicit to our practices rather than being explicitly written down. It was Wittgenstein who stressed that explicit rules cannot but rest on some other rules that cannot be explicit. (This does not necessarily mean that there are rules that could not be made explicit at all; it means that it is never the case that all rules are explicit.) It is the existence of such implicit rules that presupposes the existence of the vastly complex practices we humans have developed, it is especially connected with our *reflective* practices of *taking or treating something for right/wrong*.

It is especially the implicit rules that lay the very foundation of the normative dimension of our human world and which provide for the irreducibility of 'the normative' to 'the descriptive' - the rules exist exclusively through our 'takings and treatings' and hence each such 'taking or treating' may contribute to helping them into being, reinforcing them or, conversely, undermining or cancelling them¹¹.

(c) The rules of language constitute, in their complexity a unique kind of structure that fosters the emergence of propositions, concepts and other entities discussed by semanticists.

⁹ See Peregrin (to appear).

¹⁰ See Lance (1998).

¹¹ See Peregrin (*ibid.*).

From our viewpoint, all of them are primarily certain specific kinds of roles conferred on expressions by the rules¹².

Closing comments: The revival of proof theory

Starting with Frege, modern accounts of the semantic aspect of language have strongly drawn upon the conceptual resources of logic (more precisely, in the hands of Frege and his successors, tools of accounting for semantics co-developed with the tools of formal logic). Frege, we can say, in effect divorced semantics from psychology and wedded it to logic and mathematics. Does the approach to language envisaged above signal another divorce, this time divorcing semantics from logic and wedding it to evolution theory or to sociology? Not really, for the interaction of semantics with the study of human communities and its interaction with logic take place on different levels and are not really incompatible. The point is that the former contributes to answering the philosophical question of *what meaning consists in*, whereas the latter deals with more specific problems of *explicating meanings* (which are solved on the background of a framework established by the former).

To envisage the kind of interaction with logic this approach to language calls for, let us first briefly return to the history of modern interaction of logic and semantics. In the second part of the twentieth century, the common view was that the ultimate breakpoint of the interactions had been Tarski's (1939) development of "scientific semantics", which provided for the explicit means of capturing certain aspects of meanings within the framework of logic. Indeed, if you believe that the nature of language rests on the fact that words are meaningful in that they encode some entities, then you will be inclined to see Tarskian formal semantics, which consists in associating words (of a formal languages) with "semantic" (usually set-theoretical) entities, as a direct reflection of this. Assigning subsets of the universe to unary predicates will appear, from this perspective, to be reflecting the fact that what intransitive verbs or adjectives of natural language encode are groupings of things. Moreover, further versions of formal semantics developed which were more faithful to natural language, such as the celebrated intensional semantics of Montague (1974).

But what if we reject, as we did, the code conception of language? What if we insist that what an expression means is not what it stands for, but rather what its role is *vis-à-vis* the rules of language? Then, if we want to keep engaging logical tools within semantics, we have two possibilities: either we can try to reinterpret formal semantics so that it is less intimately connected with the code conception, or we can turn to a theory which accounts, more directly, for inferential rules.

Both these ways are passable. The first of them consists in starting to see the set-theoretical denotations assigned to expressions by formal-semantic interpretations not as proxies for the entities which expressions of natural language encode, but rather as some encapsulations of

¹² See Peregrin (in press).

their inferential roles. Thus, the fact that, for example, the predicate *dog* denotes a set which is a subset of that which is denoted by *mammal*, is not interpreted as reflecting the relationship between corresponding ideas/properties/collections which have been encoded by the two predicates, but rather it is interpreted as the fact that the sentence which arises from the combination of a name with the latter predicate is always correctly inferable from that which arises out of the combination of the same name with the former one¹³.

The second possibility consists in diverting attention from formal semantics (or model theory) to proof theory. This branch of logic is even older than formal semantics, but its early development, after it was devised by David Hilbert within his pursuit of grounding the whole of logic and mathematics in a simple combinatorics of symbols, led to fairly complicated mathematical investigations of the logical foundations of mathematics, without addressing anything like inferential roles of expressions directly. It was the legacy of Gentzen which has led to what is now sometimes called structural proof theory and which directly addresses inferential systems as algebraic structures, and the roles expressions play in respect to them¹⁴.

However, the version of proof theory most straightforwardly applicable to our take on semantics is the dialogic logic of Lorenzen (1955). This approaches language as the means of playing the *game of giving and asking for reasons*, and may provide for its logical foundations. But as we now know, this aspect is in many respects equivalent to other proof-theoretic approaches. In any case, here is where the above sketched approach to language and meaning, based on the rejection of the code conception, meets logic: it resonates with the current revival of interest in proof theory (which has been motivated largely for independent reasons).

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¹³ See Peregrin (2001, Chapter 8; 2006).

¹⁴ See Negri and von Plato (2001).

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