

# THE METAPHYSICS OF NATURAL LANGUAGE(S)

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## 1 INTRODUCTION

*Natural language metaphysics* is the study of what kinds of things, distinctions, and so on are necessary for an adequate account of the semantics of natural Language and natural languages [Bach, 1981; 1986b].

*What is there?* is the fundamental question of metaphysics.

*What do people talk as if there is?* is the fundamental question of linguistic semantics.

There is an old tradition, still very much alive, that says that the answers to such questions will vary from language to language. So what we believe or presuppose about the nature of reality will differ according to whether we are speakers of Hopi (say) or English.

The language Hopi (Uto-Aztecan) is mentioned advisedly. Benjamin Lee Whorf [1956b] claimed that the basic view of reality — in a word, the metaphysics — embodied in the Hopi language was radically different from the basic world view of the Standard Average European languages (which would include Modern English). The latter was supposed to be fundamentally Newtonian: concepts of *time* and *space* as absolute containers, separate and rigid, as opposed to the much more Einsteinian or relativistic view underlying the Hopi world view.

It is unclear whether claims like Whorf's are about a culture or a language, and some would question whether such a division is a help or a hindrance. In any case, we take the point of view here that it is possible to make such a division and ask about metaphysical assumptions that are built into the semantics of a language.

We follow the route of model-theoretic semantics. To spell out the semantics of a language is to associate denotations and other kinds of meanings with the expressions of the language. To give a general account of a framework for doing this for natural languages — Modern English, Swahili, Hopi — choices must be made for the objects that are to be candidates for these denotations: things, functions, numbers, mountains, people, wars, and the like. These choices imply what the universe of meaning is like, and in this sense provide a metaphysics for the language [Quine, 1948; Cresswell, 1973]. An immediate question is then:

What is common to different languages in their universes of meaning and where do languages differ? This is the import of the parenthesized plural in our title.

Linguistic semantics follows the general plan of attack familiar from other sub-disciplines such as phonology or syntax: it must provide a general theory which captures what is common to all languages and provides the means for registering possible differences among them. An essential part of the general theory is a model structure that contains the ingredients for specifying the denotations of expressions of the language(s) under consideration. At the least we need these components:

- (i) truth values: {TRUE (1), FALSE ( $\emptyset$ ),  $\cup$  (undefined)<sup>1</sup>}
- (ii) a set of individuals
- (iii) a set of worlds: ways things could be
- (iv) all functions that can be built out of the preceding

Note that there are no constraints on what the individuals are. In PTQ [Montague, 1973] the basic set of expressions in the set indexed by the category of names include *John*, *Bill*, *Mary*, and *ninety*, presumably people and a number.

We suppose (standardly) that expressions in a natural language are interpreted in context so we need to embed our semantics in a pragmatic theory (in one sense of “pragmatic”): this makes it possible to fill in denotations for indexicals (context-dependent elements) like tenses, and words like *I*, *you*, *here*.

Once we have established what is referred to by such indexicals in a given context, we can ask what the semantic value or denotation of the expression in question in a certain world or situation is.

Where and how can differences and generalizations about meaning be registered in semantic theories? We assume the following possibilities, each of which constitutes a major debate in semantics (see [von Stechow *et al.*, forthcoming] for details and references):

- (i) denotations (“semantic values”)
 

Examples: *John Smith* denotes John Smith; *snow* denotes snow; *it is snowing here* denotes the value *true* if and only if it is snowing at the place of assertion at the time of the assertion, . . .

In the present context the important contrast is with concepts as meanings. *The cat is on the mat* makes reference to a real cat and a real mat (perhaps in this world, or another possible world).

- (ii) indexicals and other context dependent items, variables
 

Besides the obvious examples already mentioned, sometimes we need to supply a parameter from “outside”. For example: *the white dog* might need a local context to support the uniqueness presupposition of *the*.

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<sup>1</sup>We assume a third truth value, for example, to take care of situations where we want to use sorted domains to enforce collocations and we want to say that a sentence may be neither true nor false. PTQ allows sentences like *Ninety seeks a unicorn* (more below).

## (iii) entailments

*John went to the store* entails that John got to the store.

*John was going to the store* does not.

## (iv) presuppositions

*Why did you let the dog out?* presupposes that you let the dog out.

## (v) meaning postulates

A meaning postulate is a semantic tool to put constraints on denotations. For example, Montague used meaning postulates to ensure that certain verbs, like *see* guaranteed the existence of a thing seen, as opposed to a verb like *seek* which has (alas!) no such guarantee.

Sometimes this is the best way to understand the next item:

## (vi) semantic parameters / features

Features are familiar from other parts of linguistic theory, but may play a role in semantics as well as signalling particular choices within a general domain of interpretations [Chierchia, 1998].

## (vii) conventional implicatures

Elements of meaning that are not directly asserted (cf. [Karttunen and Peters, 1979; Potts, 2005]):

*He managed to get the job done* implicates that it was difficult to get the job done.

The term was originally coined by Grice to cover individual expressions whose meaning apparently does not contribute to part of the propositional content expressed in an utterance, but nonetheless is conventionally associated with a given word [Grice, 1975]

## (viii) conversational implicatures

The concept of *conversational implicature* on the other hand, also a term coined by Grice, was to label those aspects of the interpretation of an utterance which are not intrinsically associated with what is expressed by the uttered sentence, but involve some step of inference made by combining what is directly expressed by that utterance with additional assumptions [Grice, 1975]. Upon recurrent repetitions over time, these may give rise to so-called *generalized conversational implicatures*, and constitute a quasi-idiomatic usage of language, as in utterances of (1) conveying ‘Please pass the salt (if you can reach it)’:

(1) Can you reach the salt?

These concepts, straddling conventional and nonconventional usage of language, have generated a great deal of discussion: see the debates as presented in [Horn and Ward, 2005].

(ii) connotations, associations etc.

These are not usually dealt with in formal semantic theory, but nonetheless constitute important parts of meaning in the broad sense: for example, so-called epithetic words convey attitudes of the speaker toward the referent, *the bastard*, *the sweetheart*, etc., and probably contribute to the common intuition that “you can’t really translate from one language to another”.

It is not always easy to know just where certain aspects of meaning are to be accounted for. We will see below (Section 4.4) one case where it is claimed that what is an entailment in one language is a cancelable implicature in others.

In the rest of this essay, we want to survey some of the main kinds of elements that have been put forward as possible further ingredients of the interpretations of natural languages. The means by which these additions or elaborations have been made are basically two: additions have been made to the basic model scheme outlined above, or structure has been attributed to already present or newly proposed domains. An example of the first type is the addition of Properties as an independent domain; an example of the second type is sorting the domain of individuals into Kinds, Individuals, and Stages. We discuss examples of both kinds below.

## 2 HISTORY

Apart from details about time and worlds, the foregoing is the basic structure of the first introduction of model-theoretic ideas into the analysis of meaning in natural languages from the work of Montague [1973] (others: [Cresswell, 1973; Lewis, 1970; Keenan, 1972; Partee, 1973; 1975; see Partee, 1996]).

One idea that was expressed at that time was that it was possible to separate questions about the meaning of particular words and idioms — lexical semantics — from the recursive specification of the meaning of constructions in syntax:

*... we should not expect a semantic theory to furnish an account of how any two expressions belonging to the same syntactic category differ in meaning* (Thomason, Introduction to [Montague, 1974, p. 48])

The passage is accompanied by the following footnote:

The sentence is italicized because I (i.e. Thomason) believe that failure to appreciate this point, and to distinguish lexicography from semantic theory, is a persistent and harmful source of misunderstanding in matters of semantic methodology. The distinction is perhaps the most significant for linguists of the strategies of logical semantics.

Some “logical” words were the exceptions to this division: quantifiers, *be*, conjunctions, and so on. As more details about English and other languages were incorporated into explicit semantic accounts it became apparent that it was necessary to “go inside” the meanings of lexical items.

This principled division foundered on the analysis of such constructions as the English progressive, where it turned out that the truth conditions depended precisely on the meanings of various verbs [Dowty, 1977; Vlach, 1981; see below Section 4.4]. Max Cresswell [1973] was one writer who took it upon himself to spell out the “metaphysics” of his various constructions: propositional languages and lambda-categorial languages used as a bridge (like Montague’s Intensional Logic) to interpret English.

Montague’s fragment PTQ [Montague, 1973] included the absolute minimum needed to illustrate his general proposals: three tenses (present, present perfect, future with *will*), singular nouns, names, and third-person pronouns, three determiners including *the*, the sentence adverb *necessarily*. These were used to illustrate Montague’s treatment of tense, modality, and intensionality. Naturally, in the early years of the adoption of his work into linguistic semantics there were proposals for extending the coverage of English and other languages: English words like *proposition*, plurals, and other tenses and aspects. We will start with more details about Montague’s work and these earliest extensions in the separate sections below. As we will see, many of the extensions pointed toward a more complicated story about *structural* and *lexical* semantics.

The earliest extensions of Montague Grammar in linguistics were aimed at covering a larger part of English, by including plurals, more options for tenses and aspects, propositions, and so on. For the most part these extensions used the apparatus that was already implicit in the basic model structure of PTQ, for example, Michael Bennett incorporated plurals into his treatments, and used sets to model them [Bennett, 1974].

The idea that there is a fundamental difference between the meanings associated with lexical items and with grammatical distinctions is an old one, obviously related to the difference just mentioned between structural and lexical semantics [Jakobson, 1959; Bach, 2005].

Model-theoretic semantics has been based most usually on set-theory and higher-order logic. That is, it countenances sets or classes of objects, functions on those objects, functions on those functions and so on. So insofar as it makes use of these tools, there is a sense in which it incorporates some metaphysical assumptions about such abstract objects. An alternative or supplemental basis is mereology — the theory of part-whole relations [Stein, 1981; Link, 1983; Champollion, 2010].

Another important stream in linguistic semantics comes from the works of Donald Davidson [1967; 1980], who insisted on the importance of events as ingredients in the interpretation of language. We will take up this theme in later sections (especially Section 4.4).

### 3 BASIC MODEL STRUCTURE

We consider some general questions about the basic model structure in this section. In the next we take up some more special questions about various domains.

#### 3.1 *Time and Tense*

We take up first a question about the basic model structure outlined above. Montague's model structure for interpreting English in PTQ includes a set of possible worlds and a set of times. The times are ordered by a relation  $\leq$ , which is total, transitive, and antireflexive: for all  $i, j, k$  (points in time, say):

- (i)  $i \leq j$  or  $j \leq i$
- (ii) if  $i \leq j$  and  $j \leq k$ , then  $i \leq k$
- (iii) if  $i \leq j$  and  $j \leq i$  then  $i = j$ .

How can we support or defeat these assumptions about the structure of time in terms of *natural language* (or English) *metaphysics*? It obviously won't do just to ask speakers of natural languages. St Augustine said (Confessions, XI):

“What then is time? If no one asks of me, I know; if I wish to explain to him who asks, I know not.”

And indeed there have been other native speakers of Whorf's “Standard Average European” (SAE) languages who have argued for diametrically opposed notions of *time*: Aristotle vs Plato; Leibniz vs Newton. On the one side is the idea that *time* does not have any independent existence, but is rather constructed from basic relations among events; on the other is something like Whorf's idea about the SAE conception. But we can no more ask directly of native speakers that they do our analytic job for us in this domain than in other parts of linguistics. In the semantic domain we need to look at judgments of acceptability, inferencing, incompatibility, and so on, which constitute the data relative to which competing semantic theories are judged.

For example, we can test assumptions about time, by asking for judgments about specific expressions in a language:

- (2) If Mary had left on her spaceflight, she would now be eating breakfast.

Interpreting this sentence requires reference to two possible worlds: the world in which Mary did leave and the other — the real world of “here and now” — in which she did not leave on her spaceflight. Moreover, it requires identifying times across these two worlds. It is doubtful that the possibility to make this identification should be a *semantic* assumption, given that it is not possible to identify times in different space-time regions in this world.

In the papers just cited, Bach argued for a rather different way of dealing with temporal relations, based on ideas of Wiener [1917], Whitehead [1920], and Russell [1929], and adapted by Hans Kamp [1980] (see now also [Fernando, 2009]).

The basic idea is that temporal notions can be construed as relations of precedence and overlap among events. A set of events connected by these relations is a (local) *history*. It is not assumed that all events in a possible world are so connected. With such an underspecified model it is possible to deal with situations or worlds in which series of events can be considered which are locally ordered but where it may not be possible to link across two such series for all events. Kamp gives two examples where such models would be useful: (a) a narrative where two or more story lines connect up at various points but where intermediate steps in the separate story-lines need not be temporally pinned down; (b) several changes where the exact point of the changes is left vague. Such a temporal model would also be well suited to accommodate versions of relativity theory. The main point is to allow a flexible semantic framework within which to consider the interpretation of examples like (2).

There are further questions about the structure and nature of time in a setup like that of PTQ:

- (i) Are the elements of the time line points or intervals?
- (ii) Does time conform to the structure of the real line, or the rational numbers, or the integers?

and so on.

We believe that time-talk in natural languages is pretty indeterminate in respect to these abstract qualities and that our model structures should reflect this indeterminacy. Some sentences seem to require that we can know what it means for one thing to happen “right after” another, while others seem to admit that between two happenings we can always find something that happened “between them” (compare [Bach, 1981], and the discussion of “achievements” below, Section 4.4).

### 3.2 *Worlds and Situations*

In standard possible world semantics, a world is just a way everything can be, everything. A number of writers have proposed the use of *situations*, understood as something “smaller” than worlds but of the same logical type. This idea has been spelled out in various ways by Cresswell [1973], Kratzer [1989], Barwise and Perry [1983], and others. (See [Kratzer On line, 2007/2009], for a good survey.) One way is to consider situations as partial worlds, with classical worlds being maximal situations. (We return to these ideas in discussing kinds, individuals, stages in Section 4.2.)

If we keep the basic model structure outlined above but reinterpret worlds as situations in this broader sense, we will gain some new options: the value or

extension of an individual (concept) will vary according to the situation it takes as an argument.

Kamp's *Discourse Representation Theory* needs a separate rubric here. Although the units of his theory — *Discourse Representation Structures* (DRS's) — bear some resemblance to situations in the above sense, they are really something intermediate between a linguistic representation and a model [Kamp, 1981; Kamp and Reyle, 1993; Asher 1993]. They share the quality of partiality with the situations we have just mentioned. Presumably metaphysical questions arise in the embeddings of the DRS's into classical models.

### 3.3 *Properties*

In addition to worlds, times and events, it has been argued that our ontology needs to be expanded to give recognition to properties as an independent semantic type. Suppose people are the only rational animals. Then substituting *rational animals* for *people* in any sentence should preserve truth values. Now though this might hold for our world, it is easy to imagine another world in which this equivalence does not hold. The intensionality of possible world semantics, and the notion of sense which this concept is defined as reflecting, allows us to deal with the problem presented by sentences like these:

- (3) People have two legs.
- (4) Rational animals have two legs.

We can say that in our world (3) and (4) might be equivalent, they might very well not be equivalent in other possible worlds. This is a simple illustration of how intensions can help solve semantic problems. At the level of individuals, intensional meanings for names and some other nominal expressions allow us to solve the problem of sentences about the Morning Star and the Evening Star:

- (5) The Morning Star is the Morning Star.
- (6) The Morning Star is the Evening Star.

(5) is necessarily true, unlike (6).

Montague used intensional interpretations (senses) to solve such problems. An intensional interpretation in Montague is a function from a world (actually a world-time pair, an *index*) to some extensional denotation, the value of the function at that index. So even if in our world the terms Morning Star and Evening Star have the same extension, that is, the planet Venus, in some other possible world this might not be true. Similarly for problems arising with examples like (3) and (4). Gennaro Chierchia showed how adding *properties* as special meanings allows us to deal with problems like these. To take a more everyday example, in every world the set of things that are sold is the same as the set of things that are bought. So necessarily, if we build up a complex predicate compositionally by adding a

reference to an agent, we get the equivalence of *sold by Mary* and *bought by Mary*. Adding properties as an independent type of denotation allows us to circumvent this and similar problems [Chierchia, 1984; Chierchia and Turner, 1988].

## 4 ONTOLOGICAL CHOICES

We now consider some ideas about the nature and structure of special domains within the broad model structures posited for natural language semantics, and the ontology to which natural language distinctions appear to commit us. As Godehard Link put it: “our guide in ontological matters has to be language itself” [Link, 1983].

### 4.1 *Things and Happenings*

One of the peculiarities of the predicate calculus, from the point of view of natural languages, is that there is only one kind of predicate, so that the correspondents of *dog* and *run* have the same logical type and form. So also in PTQ: common nouns and intransitive verbs are syntactically distinct but map into the same type in the interpretation, sets of individuals or their intensional counterparts — individual concepts. Similarly for relational nouns, transitive verbs, and so on.

From the point of view of natural language, it seems that there is a pervasive difference between things and happenings, independently of how this is expressed in the syntactic and morphological categorizations of the languages in question.

In English, for example, there is an affinity between certain predicates and happenings:

- (7) The war lasted seven years.
- (8) Jonathan lasted seven years.
- (9) The parade took place in the center of town.
- (10) ?Harry took place in the 20th century.

(7) and (9) are perfectly ordinary sentences. With (8) we have to supply some understood amplification: ‘as chairman’ or the like. (10) is anomalous unless we understand *Harry* as the name of an event or come up with a metaphorical understanding.

There has been a long-standing discussion about the universality of “parts of speech,” including much discussion about whether all languages distinguish nouns and verbs (and sometimes adjectives): [Sapir, 1921; Bach, 1968; Kinkade, 1983; Jacobsen, 1974; Jelinek and Demers, 1994; Jelinek, 1995; Demirdache and Matthewson, 1995; Baker, 2003; Evans and Osada, 2005]. A number of different questions are involved in these debates, among them the following:

- (i) Does every language distinguish between nominal and verbal syntactic constructions?
- (ii) Do all languages make a distinction between the lexical categories of *noun* and *verb*?

There is no doubt about the answer to the first question. Every language must be able to make truth-bearing constructions (assertions). And every language has a means to refer to an unlimited number of different entities. Quine's minimalist language [Quine, 1948] makes do with a single lexical class but must still include variables as a second category (as well as quantifiers and other syncategorematic signs).

Compare Sapir [1921: 119]:

Yet we must not be too destructive. It is well to remember that speech consists of a series of propositions. There must be something to talk about and something must be said about this subject of discourse once it is selected. This distinction is of such fundamental importance that the vast majority of languages have emphasized it by creating some kind of formal barrier between the two terms of the proposition. The subject of discourse is a noun. As the most common subject of discourse is either a person or a thing, the noun clusters about concrete concepts of that order. As the thing predicated of a subject is generally an activity in the widest sense of the word, a passage from one moment of existence to another, the form which has been set aside for the business of predicating, in other words, the verb, clusters about concepts of activity. No language wholly fails to distinguish noun and verb, though in particular cases the nature of the distinction may be an elusive one. It is different with the other parts of speech. Not one of them is imperatively required for the life of language.

(This passage occurs immediately after a paragraph disparaging the idea that parts of speech might be universal. Sapir opts for a language-particular view of such distinctions.)

The second question is altogether different. It is still debatable whether lexical classes like *noun* and *verb* and *adjective* must be distinguished in every language. It is not in question whether these categories are part of a universal stock of available categories nor that *nouns* and *verbs* are specially connected to the syntactic categories associated with naming and referring, and predicating.

There is no doubt that we can refer to the same event using either nominal or verbal expressions. Further there must be logical connections between these references as shown by Terry Parsons' examples [Parsons, 1990:18]:

- (11) In every burning, oxygen is consumed.
- (12) Agatha burned the wood.

(13) Oxygen was consumed.

What we have considered in this section is related to a question that will come up below when we talk more directly about events and other species of eventualities (Section 4.4).

The pertinent question in the present context is whether there is a significant semantic contrast between common nouns and verbs. A positive answer to this was given some time ago by Gupta who pointed out that nouns carried with them a principal of reidentification, so that it makes sense to apply the adjective *same* to a noun, whereas it is difficult to get that idea across in a purely verbal construction:

(14) Is that the same squirrel / man / explosion / burning that you saw?

(15) ?? Did Superman and Clark Kent run identically / the same / samely?

(16) Did Harry run the same run / race / route as Sally?

(Compare [Gupta, 1980], also [Carlson, 1977; Baker, 2003].) Note that this notion of sameness (and difference) can be applied to kinds and ordinary individuals (see next section):

(17) Is that the same dog? Yes, it's a Basenji. / Yes, it's Fido.

#### 4.2 *Kinds, Individuals, Stages*

An early refinement of the simple model given above was introduced by Greg Carlson [1977] in his investigation of generics and related matters. The discussion continued [Carlson and Pelletier, 1995] and has been one of the liveliest topic areas in linguistic and philosophical semantics.

Carlson proposed that the domain of entities should be sorted into three sub-domains: *kinds*, *individuals*, *stages*.

Two realization relations were posited to link *kinds* and *individuals*, and *individuals* and *stages*. We note here a parallelism between the relations of *kinds* and the individuals that realize them and *individuals* and stages — the latter something like local manifestation of individuals (compare here Cresswell's notion of *manifestations* of individuals, [Cresswell, 1973]).

English has a variety of ways of referring to these various sorts:

(18) Horses disappeared from the New World between 10,000 and 8,000 years ago.

(19) Horses were running down the road.

(20) *Equus* evolved mostly in the Americas.

(21) Horses are mammals.

(22) A horse is a mammal.

- (23) The horse is a noble beast.
- (24) The horse is standing ready for you.
- (25) Man is not grand.
- (26) I hate rabbits, because they are destroying my cabbage patch.

The significance of the last example is that it shows anaphoric reference from one kind of interpretation (*kind*) to another (*stage*). Sentences like that one were taken by Carlson as evidence for locating difference between individuals and stages in the linguistic context rather than in the nominal itself. In fact there is widespread systematic understanding of different senses of lexical items (a big literature on this topic, see for example [Pustejovsky, 1998]).

Are Carlson's *sorts*, or something like them to be found in every language, that is, should we think of them as a necessary part of *natural language metaphysics*? It is certainly not the case that the means of expressing them are the same across languages. A good selection of the variety can be seen in our English examples: bare plurals, definite and indefinite noun phrases, bare Latin names in scientific parlance, and even a bare singular as in (24), a normal pattern in some languages. Let us also note here Daniel Everett's claim [Everett, 2005] that there is no expression of genericity (or quantification) in Pirahã.

#### 4.3 Mass, Plurals, Counting, Numbers

A similar challenge occurs in the subtyping of kind-denoting expressions. PTQ has eight common nouns: *man, woman, park, fish, pen, unicorn, price, temperature*. They are all count nouns, that is they have plural forms (*fish* has two: *fish* and *fishes*), although as we noted the PTQ fragment has no plural forms. The full array of nouns in English comprises several other kinds, among them one — mass nouns — that has gained considerable attention.

An important (and old!) set of problems was brought to the fore especially in the work of Godehard Link on the interpretation of mass, count, and plural terms and predicates appropriate to them [Link, 1983]. In English, mass terms have no plurals, resist collocations with number words:

- (27) #There were five muds on the floor.
- (28) There were five blotches of mud on the floor
- (29) These muds are quite distinctive.

Here, we have to understand the plural in (29) as referring to kinds of mud, and (27) can perhaps be coerced into this kind of understanding.

Plurals and conjunctions of names show several interpretations:

- (30) The boys carried a canoe down to the lake.

(31) Sally and Mally lifted the suitcase.

These sentences can be made more precise by *each* or *together*.

(32) We saw dolphins on our excursion.

Is this sentence true if we only saw one dolphin? Group readings for plurals are easy to obtain and real in real life. The same people can meet as a finance committee, adjourn, and meet again as a policy committee [Landman, 2000; Schwarzschild, 1991]. Behind such familiar concepts, there are related questions about the universality of counting and numbers, starting from Everett's claims about the Amazonian language Pirahã [Everett, 2005; Nevins *et al.*, 2007]. Such discussions raise important points about the nature of universals as overt or covert categories in language, as potential or realized. We wish to draw attention to an important paper by Ken Hale [1975], which underlines the potential character of universals and also the role of cultural needs for one or another of such potential resources. Here it seems that all the necessary ingredients are potentially there for constructing the meanings of numbers, in the very notion of a set, presumably part of the metaphysical furniture of every language.

#### 4.4 Verbal Aspect (*Eventology*)

Verbal *aspect*, *Aktionsart* (“eventology”) is the classification of eventualities and/or expressions about them due to Aristotle, Kenny, Vendler, Verkuyl, Dowty, and many others. A major part of the discussion has centered around the possibility and interpretation of (English) sentences using the progressive aspect:

Sentences like those set out below and many others have been used to establish classifications of eventualities into (at least) three types: *states*, *processes*, *accomplishments* (originally also *achievements*). Nowadays, a more favored terminology seems to be *telic* versus *atelic* events for accomplishments and processes, respectively. Terry Parsons, in the most detailed study to date of the role of events in the semantics of a language (English, [Parsons, 1990]), writes of events as having two parts: a development and a culmination (= *telos*), so that processes are simply events with no culmination, accomplishments include both a development part and a culmination.

Here are some examples and discussion:

##### A. *States*

(33) John is in London.

States resist construal with the frame *it took ...* [duration expression], *to ...* or with the progressive

(34) It took John three years to be in London.

Here we have to understand (34) to mean come to be in London or the like. Similarly with (40) below: to come to know the answer. (37) is a stative sentence. Construed with the progressive as in (38) we have to understand the sentence as being about a temporary state. Locative *be* (33) is most resistant to any kind of reconstrual as an activity or process (35). Compare (35) with the activity *be + Adjective* (36) [Partee, 1977].

(35) ?John is being in London.

(36) John is being difficult.

(37) Mary lives in London.

(38) Mary is living in London.

(39) ?Sally is knowing the answer.

(40) ?It took Sally three hours to know the answer.

*B. Processes (activities, atelic events)*

*Processes* contrast with *states*; note the acceptable (41)-(46). (The term *activity* has the difficulty that it connotes agentive involvement, while *process* is neutral in this dimension.)

(41) Harry is mowing the lawn

(42) Harry mows the lawn.

(43) Ed was mowing the lawn.

(44) Rose was running.

(45) Rose ran.

(46) Rose was running to the store.

*C. Accomplishments (protracted telic events)*

(47) Jamison crossed the street.

(48) Jamison was crossing the street.

(49) Jamison was crossing the street, when the truck hit him.

Much discussion, started by Dowty [1977], centered on sentences like (47)–(49), illustrating the “imperfective paradox” or puzzle: though (48) seems to entail the truth of (47), (48) can be true without (47) being true, as shown by (49).

*D. Achievements? (instantaneous telic events)*

(50) Harry realized something.

(51) Harry was realizing something.

(52) As soon as Bill got up, he was up.

Unlike the previous categories, achievements are not as robust. Originally, they were supposed to be impossible to use in the progressive, and this was supposed to be because they were instantaneous while accomplishments were supposed to take time. In our opinion the closest we can come to really instantaneous events are mental ones like realizing (50). Nevertheless we can think of contexts where even such happenings can be construed as processes. Imagine we are watching Harry's brain with a device (a "chronoscope") that can slow down events to perceptible rates. Then (51) seems perfectly understandable. But it seems that there is nothing in our language that prevents us from talking about instantaneous events, as in (52).

Here we will look at a different puzzle, centering on sentences about accomplishments:

(53) I fixed the fence.

(54) ?I fixed the fence, but I didn't finish it (i.e. fixing the fence).

An English sentence like (53) entails that the accomplishment indicated was successful, that is, that it reached a culmination [Parsons, 1990]. It has been claimed that this entailment does not hold in all languages, most recently in various Salishan languages [Bar-el *et al.*, 2005], but that a weaker notion of implicature is correct. Hence, the implicature can be canceled, so that sentences corresponding to ones like (54) are apparently completely unproblematical.

A related puzzle has to do with the interpretations of plain past tense sentences in English and (among other languages) Dutch [Landman, 2009]:

(55) Ik sliep.

(56) I slept

(57) I was sleeping.

(55) can be interpreted either as (56) or (57). The main question here is whether there is a genuine ambiguity here or whether there is an interpretation of the simple past in such languages that covers the denotations that are split up in English under some unified field, just as the denotation of common nouns in languages that do not have obligatory plurals can be understood as denoting something like the union of interpretations for singular and plural nouns in English-type languages.

#### 4.5 Unifications and Parallels

Parallelisms across the various areas discussed have been noted for some time, for example the domains of count-mass- plurality and verbal aspect (see [Bach, 1986a] and literature cited there).

Recently, the parallels have been extended and sharpened in the work of Lucas Champollion [2010], who has posited a formal and substantive theory that unites three areas: *verbal aspect (Aktionsart)* (58), *measurement* (59), and *distributivity* (60):

(58) John left. / John was leaving.

(59) 5 kilos of apples / six feet of snow / \*six degrees of snow

(60) all the boys lifted the piano / each of the boys lifted the piano

Champollion provides a semantic theory that gives a unified account for a wide range of facts about interpretation, acceptability, and logical properties of natural language expressions in these three domains. The theory is couched in a mereological (part-whole) frame rather than the more usual set-theoretical base. The central concept that makes the unified theory possible is that of stratified reference. The basic property that is at the basis of the unification is *boundedness*, as exhibited in these examples from Champollion's work, with the usual tags used for the contrasts in the literature:

(61) (a) John ran for five minutes. *atelic*

(b) \*John ran to the store for five minutes. *\*telic*

(62) (a) thirty pounds of books *plural*

(b) thirty liters of water *mass*

(c) \*thirty pounds of book *\*singular*

(63) (a) The boys each walked. *distributive*

(b) \*The boys each met. *\*collective*

Champollion constructs a general theory that posits two parameters that can be set to account for the parallelism and differences across the several domains: *dimension* and *granularity*. The empirical basis of the work draws primarily from the three construction types illustrated in examples (61)–(63) and from a host of other facts from English and other languages.

An important part of Champollion's theory is that it allows for the possibility of parametrized and context-dependent aspects of meaning. For example the granularity option can reflect the difference between talk about an hour of dancing and centuries of political change.

## 4.6 *Ontological Sources for Grammar*

The rich ontological zoo, of which we have just caught some glimpses, plays a crucial role in offering options for what can be talked about in natural languages, but also provides a matrix for grammar. Many categories in syntax and morphology draw upon the distinctions we have mentioned but many others as well. We give some examples, framed in terms of the grammar, in each case taking up the question of how such grammatical categories might play a role in natural language metaphysics. (Information about the kinds of classifications that languages make in their grammars can be drawn from many handbooks and grammars for individual languages. We draw attention to Greville Corbett's excellent surveys of several such domains, listed in our references.)

### 4.6.1 *Gender / Noun Classes, Classifiers*

Gender systems that are familiar from Indo-European and Semitic languages based on sex of an individual are but one of a number of such classifications: *masculine* and *feminine*; *masculine*, *feminine*, and *neuter*; *common* and *neuter*; *animate* and *inanimate*. These are some of the more familiar schemes. In all such systems that we are aware of there is a certain amount of slippage and arbitrariness. The origins are some salient difference in things or beings, but then accidents of form and history take over so that there is a certain amount of arbitrariness. This extends even to systems that seem to be semantic in nature. Whorf [1945] records such "covert" categories for English nouns: for example, *she* referring to boats of a requisite importance or size. The noun classes of Bantu languages fall under this type as well, again with a very loose correlation with semantic categories. These nominal classifications make themselves felt primarily in agreement systems as expressed on: determiners, adjectives, subject and object marking on verbs.

Related to the category of gender, classifier systems prototypically have to do with counting, and we can see a faint bit of it in English: *five head of cattle*, *six pieces of furniture* and related measure phrases. Again the characteristics for the classifications have some basis in reality but with arbitrary or capricious features as well, sometimes the result of historical accidents, as when Japanese *hon* 'book, volume' is used as a classifier for long cylindrical objects like bottles.

Thai has one of the most elaborate systems of classifiers, with several hundred. One classifier (*t'uā* or *dtua*) is used for larger animals, furniture like tables and chairs, suits of men's clothing — so far, things with arms and legs — but also germs and fish!

### 4.6.2 *Grammatical Number*

Familiar number categories in grammar are singular and plural, but systems with dual are not uncommon. Number is sometimes obligatory and general for all nominals (and agreeing determiners, verbs, adjectives) as in English, but a widespread

trait is for number to be restricted to human or perhaps animate things, and optional. Many languages do not distinguish singular and plural nominals.

Number enters into lexical distinctions as well. It is fairly common for languages to use completely different roots for verbs with singular and plural subjects or objects. Coast Tsimshian, for example, expresses ‘run’ with *baa* for singular, but *k’ot* for plural subjects.

We close this section, which could go on to many other areas where languages draw on semantic domains to people their grammars, reversing Quine’s well known quote: philology recapitulates ontology. ([Quine, 1960: viii] “Ontology recapitulates philology” playing on Haeckel’s “Ontogeny recapitulates phylogeny”.)

## 5 FROM NATURAL LANGUAGE METAPHYSICS TO REAL METAPHYSICS

A central semantic problem in this probing of metaphysics from natural language metaphysics is the issue of possible individuals. If there are individuals that are only possible but not actual, the concept of *domain* of individuals used to define a model will need to contain them but this is an issue on which it would be unethical for us as logician or linguist (or grammarian or semanticist, for that matter) to take a stand [Montague, PTQ, footnote 8].

We have drawn a distinction between what kinds of things natural language or natural languages seem to need for semantic theories and “real” metaphysics. Nicholas Asher [1993] accepts this distinction and using Kamp’s *Discourse Representation Theory* locates the step to real metaphysics at the juncture where *discourse representations* are embedded into a model, the point where *truth* enters into the interpretation [Kamp, 1981; Kamp and Reyle, 1993].

Some philosophers will say that what we are doing just *is* metaphysics. Other philosophers are interested in revisionist accounts, that is, ridding our language of various erroneous or extravagant machinery (for example, doubting whether we should countenance intensional entities like groups). That is not our aim. We believe that this kind of endeavour can be carried out under the usual strategies of inquiry followed in other linguistic domains, syntax and phonology, for example. A recurrent pair of questions is then: how much of what we are claiming about the things and distinctions we posit are universal, common to all languages, and what are the limits and possibilities of variation across languages.

Whatever the answers to such questions at this level of granularity, we hope to have shown how an articulated theory allows various options besides the strictly denotational account for coping with differences of interpretation within languages and language.

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