The syntax-semantics interface and the origins of philosophy.

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Summer 2008

0. Introduction.

The boundary of two subdivisions of grammar may hide some underlying assumptions that speakers of a language are not necessarily aware of. For example, at the boundary of phonology and morphology we find that the choice of a morpheme may depend on whether the previous syllable is stressed or unstressed. Thus, the first person plural of the French verb is expressed by the suffix +*mes* in the first case and by +*ons* in the second. Similarly, the German suffix which converts an adjective into a noun is +*heit* in the first case and +*keit* in the second (not counting the intervening syllable +*en*+). Although speakers of French or German are mostly unaware of these rules, they do apply them subconciously.

In this article I am concerned with the boundary between syntax and semantics, having observed that a number of syntactic rules depend on tacit underlying assumptions which comprise a kind of folk philosophy. In fact, I claim that much of ancient and modern philosophy is just an elaboration of such hidden assumptions.

Most of the material presented here is taken from the monograph [4] "From word to sentence: a computational algebraic approach to grammar" (if not already from earlier publications [2,3]), where it is subordinate to a mathematical treatment, which many readers may not feel comfortable with. I was led to summarize these ideas in the present more popular form, after reading the fascinating recent book [5] "The stuff of thought" by Steven Pinker, with which they have some affinity.

While the linguistic insights discussed here are based on modern English, similar observations can be made about other languages, in particular, about classical Greek. I claim that such observations led the pre-Socratic philosophers to debate certain basic questions: is the world continuous or discrete; what is the relation between space and time; what causes motion; etc.? Many of these questions are still being debated by modern physicists.

Much of early Greek philosophy has been preserved only in fragments and may be contaminated by anecdotes and later interpretations (see [1]). But this is irrelevant to my argument that the debates discussed here took place.

Grammarians of English recognize four principal word classes: nouns, verbs, adjectives and prepositions. We will look at these in turn and discuss some implicit semantical assumptions associated with them.

1. Nouns.

The class of English nouns can be subdivided into count nouns and mass nouns. While there is some osmosis between these two subclasses, they are subject to distinct morphological and syntactic behaviour. The former admit plurals, usually with the help of a suffix +(*e*)*s*, the

latter do not. The former admit certain determiners or quantifiers such as $a(n)$ or *each* in the singular, which are not admitted by mass nouns, and *many* or *all* in the plural. Mass nouns admit *much* and may even occur without determiners, as can plurals, but not singular count nouns.

For example, *bean* is a count noun and *rice* is a mass noun. We may eat *many beans*, but *much rice*. *Pea* is a relatively new count noun, re-interpreting an earlier mass noun *pease* as the plural *peas*. (Hopefully, such a transformation will not happen to *rice*.) *Pig* is a count noun and *pork* is a corresponding mass noun. Transition from one subclass to the other occurs on occasion, e.g. when cannibals express a preference for *man* over *pork*, or when someone orders *three beers*, meaning three glasses or bottles of beer.

We intend mass nouns to denote continuous substances, which retain their identity when subdivided into smaller portions (even though, in the case of *rice*, these portions should not be too small), whereas count nouns are supposed to denote discrete entities, which lose their identity when cut in two. A lively debate among pre-Socratic philosophers was the question: is nature continuous or discrete, is it made up of divisible substances or indivisible entities, which the ancients ultimately called "atoms"?

While the latter could be counted with the help of natural numbers, the former would have to be measured, involving what we now call "real numbers", originally viewed as ratios of geometric quantities.

Thales, the first recorded philosopher and mathematician, postulated just one primitive substance, namely water, and exploited the ratios associated with similar triangles in practical applications, e.g. to calculate the height of a tree without climbing it. The number of primitive substances was later expanded to four: earth, water, air and fire, anticipating the modern solid, liquid, gas and energy. It was Empedocles who first proved that air is a substance, by inverting an empty cup and immersing it in a tub of water, and observing that the water did not rush in to fill the apparently empty space.

Even before the atomists, Democritus et al., the legendary Pythagoras was said to believe that all basic entities were discrete and countable, in fact that the natural numbers *were* the basic entities. Unfortunately, his disciples noticed that the diagonal of a unit square could not be expressed as the ratio of natural numbers. (Their ingenious argument was recorded by Aristotle.)

The related mathematical question was resolved by Theaetetus and Eudoxus, who presented two distinct ways of reducing ratios of geometric quantities to natural numbers. The philosophical dispute was resolved by Aristotle in his distinction between matter and form: to measure water you count cups.

Modern physics appears to have resolved the pre-Socratic debate in favour of the atomists: everything in nature is made up of discrete elementary particles, either fermions or bosons. On the other hand, the space-time in which they live is still taken to be continuous by most physicists, as had already been argued by Zeno in one of his paradoxes. Some physicists challenge even this, but everyone agrees that the probability of a particle to be found in a certain region should be measured by a real number between 0 and 1.

2. Verbs.

In many languages, finite verb forms carry a feature of tense, allegedly denoting time. We have been taught that there are essentially three tenses: past, present and future. In inflectional

languages, these are often expressed by modifications of the verb, in which case one speaks of *simple* tenses. However, English has no simple future tense: the unknown future must be expressed by a so-called "modal" verb. Modal verbs can be recognized morphologically in that they don't adopt the suffix $+s$ in the third person singular, and syntactically in that they produce a *compound* tense from the infinitive.

Traditionally, the future was supposed to be expressed with the help of *shall* in the first person and with *will* in other persons, reflecting obligation or volition respectively. Pity the poor tourist who fell into the Thames and cried "I will drown and no one shall save me"! (Today, *shall* is usually replaced by *will*, unless both are replaced by *gonna*.) From a philosophical point of view, this is not surprising, since the future is uncertain and we only know our plan, guided by volition or obligation.

More surprisingly, what grammarians call the English present tense does not necessarily refer to the present time, as in "I pay you back tomorrow". Grammarians of some other languages have recognized this, opposing the past tense by a *non-past* in Japanese or by a *perfective* tense in Arabic.

It seems that folk philosophy does not recognize a unique future at all, but that the compound *conditional* formed with *would, could* or *should* suggests a number of possible futures, only one of which will be actualized. Surprisingly, this naïve point of view has been adopted by some modern physicists, who make allowance for an infinite number of alternative universes.

Let us look at two classes of non-auxiliary verbs, transitive and intransitive ones. The transitive verbs admit or require a direct object complement, as in *he killed* (*her*) or *she liked him*. The intransitive verbs admit no object complement, as in *the flower bloomed* or *she died*. One often thinks of an intransitive verb as expressing a state or process and of a transitive verb as expressing an action which causes such a state or process to occur. E.g. in *he killed her* the subject *he* is considered to be the agent who causes the object *her* to become dead.

However, frequently a transitive verb just expresses a binary relation between two entities, and it is not clear which of the two is to be regarded as the agent. In *I miss her*, we take the subject *I* to be the putative agent; but in French translation this becomes *elle me manque*. Even English speakers may change their minds over time. Whereas today we say *I like her*, long ago people used to say *she likes* (= *pleases*) *me*.

Many transitive verbs also express a state or a process:

<div align="center">

she has / gets a book (*a cold*),
she knows / learns English (*how to ski*),
</div>

These may give rise to doubly transitive verbs expressing causation:

<div align="center">

I give her a book (*a cold*),
I teach her English (*how to ski*).
</div>

Here *her* is the *indirect* object and may be replaced by a prepositional phrase with *to*:

<div align="center">

I give the book to her,
I teach English to her.
</div>

Whatever is the meaning of the verbs *have* and *know*, the verbs *get* and *learn* denote the corresponding process and the verbs *give* and *teach* the corresponding causation. In some languages, e.g. Arabic, causation may be indicated systematically by a conjugational pattern.

Some verbs require a complement which consists of a direct object followed by a verb infinitive. (In Latin, this construction was called "accusative with infinitive".) In English, such a complement is usually followed by the complementizer *to*, or even surrounded by *for* and *to*:

I want her to come,
I hope for her to come.

However, for some exceptional verbs the complementizer *to* is not required:

make, let, help, ..., see, hear, feel, ...

as in the examples

I let her come,   I see her arrive.

Evidently, the first three are verbs of pure causation or permission, depending on the degree of cooperation by the object, and the last three are verbs of perception.

What do these two classes of verbs have in common? To the modern reader not much; but I claim that, according to folk philosophy, perception was once considered as a kind of causation. Already the ancient philosopher Empedocles believed that "sight" rays emanate from the eye of the beholder to the perceived object, and may perhaps be viewed as creating it, as later claimed by the philosopher Berkeley.

Folk philosophy assumes that events happen because some agent causes them to happen. The idea of causation is deeply embedded in our language, yet its scientific relevance is debatable. In Newtonian physics, all processes were reversible, hence it makes no sense to say that past events cause future ones. It is only the second law of thermodynamics that attaches an arrow to time. The meaning of "causation" in quantum mechanics is still a topic of much discussion.

3. Adjectives.

In English, as in many languages, adjectives perform two different functions. They may be used *attributively* to modify a noun or *predicatively* with the help of a copula, an inflected form of the auxiliary verb *be*. Adjectives occurring in either of these positions may be modified by the adverb *very*.

English verbs possess two so-called participles: the present participle and the past participle, both helpful to form certain compound tenses, the progressive tense and the perfect tense respectively. The past participle of a transitive verb is also used for the passive construction. The present participle of an intransitive verb and the past participle of a transitive one behave much like adjectives in attributive or predicate position; yet, they are not true adjectives inasmuch as they cannot be modified by the adverb *very*.

Here are some examples and starred counterexamples:

the (*very) arriving train,   *the arrived train,
the train is (*very) arriving,   *the train is arrived,
the (*very) hated man,   *the hating man,
the man was (*very) hated,   *the man was hating.

However, there is a fairly large class of transitive verbs for which both participles are genuine adjectives, as in

> *the (very) interesting book, the (very) interested reader,*
> *the book was (very) interesting, the reader was (very) interested.*

Some, but not all of the participles associated with these verbs are listed as adjectives in the dictionary. Here is a partial list of such verbs buried in my own subconscious:

> *amuse, annoy, charm, convince,*
> *depress, disappoint, discourage, distress, disturb,*
> *excite, fascinate, frighten, interest, intimidate,*
> *intoxicate, please, satisfy, surprise......*

It is unlikely that people who agree with this list have memorized it. Instead, they have probably observed a common interpretation: these verbs all denote *causation of an emotional or mental state.* For example,

$$X \; frightens \; Y$$

means

$$X \; causes \; Y \; to \; be \; afraid.$$

As far as I can tell, a similar observation applies to German.

Of course, speakers of the language believe that they can guess other people's emotional or mental states and that they can influence these states. It would be interesting to know whether persons afflicted with Asperger's syndrome could come up with the same list.

Adverbs can modify sentences, verbs, adjectives and almost any part of speech except nouns. Many (but not all) English adjectives can be transformed into adverbs by adding the suffix $+ly$. We can say *badly,* but not **goodly,* because the adverb *well* already serves the same purpose. But why *interestingly* and not *greenly*? I have not investigated this question. However, I was amused to realize that the morpheme $+ly$ is derived from an old Germanic root meaning "(dead) body", surviving in English *lychgate* and German *Leiche.* In French, the same purpose is achieved by the morpheme $+ment$, derived from the Latin word for "mind". Do Anglophones and Francophones find themselves on opposite sides of the mind-body debate?

4. Prepositions.

In addition to naked adverbs, we also have adverblike phrases: prepositional phrases and subordinate clauses. The former are constructed from prepositions with a direct object complement, the latter from conjunctions with a sentential complement. I like to think of prepositions as "transitive adverbs".

It seems that the class of prepositions should be subdivided into two subclasses: spatio-temporal prepositions, such as *in, under, beside,....* and functional ones, such as *of, to, for,....* This subdivision is justified, for example, by looking at anaphora. When can a personal pronoun occurring as the object complement of a preposition be coreferential with a noun phrase occurring after the prepositional phrase in the same sentence? Consider the following examples:

> *Beside her$_1$, Miss Muffet$_1$ noticed a spider.*
> **For her$_1$, Miss Muffet$_1$ bought a purse.*

The pronoun *her* can refer to Miss Muffet in the first of these sentences, but not in the second, where *her* should be replaced by *herself*.

Our language allows spacial prepositions to acquire a temporal interpretation. For example, *before* (Latin *ante*, originally meaning "in front of", can also mean "earlier than", and *after* (Latin *post*) can also mean "later than". It may not be obvious that *after* once had the spatial meaning "behind", but the German noun *After* still refers to an orifice in the *behind* (Latin *posterior*).

There is a widely held belief that the native American Indian language Aymara, spoken in Peru and Bolivia, is unusual in viewing the future as being behind and the past as being in front. As the above examples illustrate, the same may be so in English and Latin.

Of course, the special theory of relativity seriously places time on the same footing as space. But I believe that this view was already expressed by the pre-Socratic philosopher Parmenides, who claimed that the flow of time is a human illusion, not shared by the gods.

5. Summary and conclusion.

In summary, I would like to argue that at the boundary of syntax and semantics there lurk a number of subconscious assumptions that embody a kind of folk philosophy. I would even like to suggest that much of ancient and modern philosophy arises from attempts to understand and justify these assumptions.

The distinction between mass nouns and count nouns raises the basic philosophical question: is nature ultimately continuous or discrete, leading to a major debate among pre-Socratic philosophers, not yet resolved by modern physics. The related question whether mathematics should be based on real or natural numbers, whether priority should be given to geometry or to arithmetic, is also still being debated by the few mathematicians interested in the foundations of their subject.

The English verb system seems to be based on the assumption that there is a definite past and there are potentially many futures, only one of which is actualized. Some modern physicists have even suggested that there are in fact many parallel universes, only one of which we happen to inhabit. The present tense is somewhat evasive and merges with the future.

Many English verbs embody the notion of causality, reflecting the speaker's conviction that she and others have some control over events, although it is not always clear who the agent is. There is a kind of folk philosophy, shared by some professional philosophers, that to perceive a thing amounts to creating it.

Of special interest is the subconscious assumption underlying the syntactic decision as to which participles are genuine adjectives. This amounts to the recognition that other people have mental and emotional states and the belief that the speaker can influence them.

The question of when a pronoun can refer to a noun phrase occurring in the same sentence is not usually discussed in traditional grammars. Attempts to answer this question suggest that spatial and temporal prepositions behave somewhat differently than other prepositions. Space may metaphorically represent time, even if counterintuitively: when we think of the past as being in front and the future behind. A similarity between time and space had already been pointed out by the ancient philosopher Parmenides and is now an essential ingredient of the special theory of relativity. However, the arrow of time is still a matter of some dispute.

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