SENSE AND SYNTAX

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HUMAN language is a medium that every normal human being controls; therefore, among the many inquiries that may be undertaken in the name of linguistics one task falling to linguistic theory in general, and to linguistic semantics in particular, is to arrive at a theoretical understanding of this medium. Theoretical understanding involves but does not consist in mere formalization; as my predecessor Professor Roy Harris justly remarked, 'one of the . . . lessons that may have been learnt from the great debates which have racked linguistic theory during the past quarter of a century was just that: almost anything linguistic . . . can be formalized if need be, and in any number of ways' (Harris 1987: 514). Professor Harris went on to argue that theoretical understanding called for the grasp of the nature of a social practice, and to express scepticism about the extent to which brain science and individual psychology could contribute to it. It seems to me that the physical and social sciences are woven together more closely than this scepticism would allow, but I agree that explanation of our grasp of language cannot be attained by poking around the nervous system, in the absence of theoretical knowledge of what to look for.

I intend here to discuss some of the problems for the theoretical understanding of language at the interface of linguistic structure and the structure of thought, the meeting of sense with syntax. These are the problems of semantics, concerned with those aspects of meaning in human languages that are

strictly determined by linguistic form. These aspects include constraints on the truth conditions of utterances in language, and more generally the conditions on reference that apply to a word or other constituent. They also include the presuppositions and implications that speakers signal by the form of their utterances, and the organization of the semantic system, with its familiar relations of synonymy, hyponymy, and others; and the rules of usage that mark expressions as, for instance, polite or impolite, formal or informal, or peculiar to this or that context. Supposing that the relations of sense to syntax are part of the overall inquiry into our grasp of the medium of language, semantic theory is then a chapter of the theory of linguistic competence in the sense originally advanced by Noam Chomsky. With this understanding we suppose that a person who knows (say) English knows (normally only implicitly) the facts of which semantic theory treats. Therefore, we may hope to set forth semantic theory as the theory of knowledge of meaning, by analogy with syntactic theory as the theory of knowledge of linguistic structure, and phonology as the theory of knowledge of the organization of the sounds of speech.

Crucial to this enterprise is the proposition that the range of meaning that an expression admits according to the linguistic system is independent of its context. In particular, the availability of a given meaning for a given form does not at all depend upon how likely it is that anyone will utter that form intending that meaning. This proposition is not at first obvious, because what we actually say is so often disambiguated in context. The actual situation is nicely illustrated by an example from Chomsky (1965). The English sentence (1), uttered as an assertion, has just one salient interpretation, namely 'I came near to suffering the theft of my wallet':

(1) I almost had my wallet stolen

On reflection, however, this sentence carries two other interpretations. Consider (2):

(2) I almost had a man arrested

The salient interpretation is, 'I was on the point of engineering a man's arrest (but did not in fact do so).' Looking back at (1), we see that this type of interpretation attaches to it as well; that is, in its range of meaning is: 'I was on the point of engineering the theft of my own wallet.' Finally, consider (3):

(3) I almost had the game won

Here the interpretation is: 'I was on the point of being in a position where I would be certain to win.' Applied to (1) an interpretation of this type gives the meaning: 'I was on the point of being in a position where I would be certain of stealing my own wallet.'

Small wonder that the salient interpretation of (1) is the only one of which we are immediately conscious on hearing the sentence. The second interpretation, which differs from the first in taking the main verb *have* in the sense of *bring about* rather than of *suffer*, would attach to the assertion of (1) only on the strange hypothesis that I was interested in getting someone to steal my wallet. The third interpretation, which uses the stative *have* of assertions like 'We have the problem solved', arguably represents a conceptual impossibility, that one should be on the point of being in the state of having stolen what is already one's own property.

Neither the overwhelming reasonableness of the salient interpretation, nor the strangeness of the second, nor the conceptual impossibility of the truth of the third, matters in the slightest to the semantic facts. Looking back on the example in the light of reflection, we see that the three-way ambiguity of (1) was always present, even if we were not explicitly conscious of it. The ambiguity was there because the linguistic system made it so.

Suppose then that we are interested in the conditions that linguistic form places on meaning. In typical cases, we confront an analytical problem in three unknowns, since we must solve simultaneously for the syntactic form, the function that maps the form into its meaning, and the meaning itself. Syntactic forms are not given in advance, and of course the mapping from form to meaning is not given either. But it is

important to recognize that meaning also cannot be taken as given, even in the case where one is inquiring about meanings in one's own language. The opacity of meaning can be missed just because of our practical mastery of the medium that we are trying to understand. Consider the English sentence *snow is white*; surely it means that snow is white, and nothing more or less. It may appear therefore that the semantic unknown disappears, and that it will be sufficient to solve simultaneously for the syntactic form and the map from forms to meanings. Such transparency of meaning, however, is an illusion. The true state of affairs becomes clear if we reflect that it would not help a person who did not understand *snow is white* to be told that it meant that snow is white. Such a person would at best know that the words *snow is white* mean that snow is white—whatever that means. In fact we do know more about the kind of meaning the sentence *snow is white* possesses, namely that it predicates being white generally of the stuff snow. Predication, however, is a historical discovery, perhaps attributable to Aristotle. Since the discovery was correct, we are entitled to presuppose its results. But it was not given in advance of inquiry.

I have said that the problem of arriving at a theoretical understanding of the semantics of individual sentences is already a problem in three unknowns. The scope of the theory multiplies when one considers that the same problem arises for every sentence, in fact every expression, of the language; and it multiplies further still when one contemplates the diversity of human languages. Recent discussions in syntax have often concentrated on the problem of explaining the basis for syntactic diversity. As originally argued in Chomsky (1980) the expectation is that, since languages are obviously diverse and since they are each individually masterable on the basis of slender evidence, it is likely that the differences we see are the deductive consequences, proliferating through the system, of a set of individually small and learnable fundamental features. A little calculation shows that the possibilities along this line are encouraging. To repeat an image that I used in an essay from

some years back, one might imagine a bank of n toggle switches, each of which represents some linguistic possibility that may be realized if the switch is set positively, or not if it is set negatively. A bank of n switches then admits 2^n settings in all, so that a set of (say) twenty minimal differences, or parameters in Chomsky's terminology, produces over a million total configurations. The programme, then, will be to identify the fundamental parametric differences between languages, within a theory with sufficient deductive structure that the variety of attested phenomena will appear.

The programme just sketched applies also within the larger domain that includes semantics as well as syntax. Let us say that a parameter is syntactic if it uses concepts drawn exclusively from the domain of formal linguistic structure, and semantic otherwise. It is certain that there are purely syntactic parameters; but it is then an open question what semantic parameters, if any, there are and what form they take. Toward refining this question I will consider some syntactic and semantic divergences between languages that have figured in recent discussion.

In English and many other languages, apart from stylistic inversion, direct objects follow their verbs. In Japanese, and also in a host of other languages, direct objects precede their verbs. There are at present two major suggestions about where this difference comes from. The simplest possibility is that there is a head parameter, i.e. a toggle that determines whether heads precede their complements (as in English) or follow them (as in Japanese). An alternative is that the fundamental order in all languages is head before complement, but that languages like Japanese require a syntactic transformation that inverts the object around the verb. In either case, the concepts required for stating this linguistic difference belong to formal syntax.

For a linguistic distinction that is not purely syntactic, consider the diversity in the distribution of what are called negative polarity items; that is, words whose appearance is dependent upon their being in the scope of an appropriately

negative expression. The best example of such an item in English is the word *ever*, which now exclusively means *sometime*, and is permitted only in appropriately negative environments. Thus (4) means: it is not the case that there is a past time t such that I solved the problem at t:

(4) I didn't ever solve the problem

Removing the negation results in the ungrammatical (5):

(5) *I ever solved the problem

Similarly, the negative verb *doubt* allows *ever* to appear in its complement clause, as in

(6) I doubt that John will ever go to France

meaning that I doubt that there is a future time t such that John goes to France at t. Replacing the negative *doubt* with a 'positive' verb results again in ungrammaticality:

(7) *I realized that John will ever go to France

The distribution of contemporary English *ever* raises very interesting questions for historical linguistics, especially in light of the fact that the word originally meant *all* (and is indeed another form of the universal *every*), though that meaning now surfaces only in formulas such as *for ever and ever*, or familiar quotations such as *men were deceivers ever*.

The elements within which a negative polarity item may appear are its *licensers*. In English, the set of licensers has spread from formal negation to others, whose negative character is buried in complex verb forms. In many human languages, however, either no such spread has occurred, or else it is confined to a few distinctive frames: in Serbo-Croatian, for example, as reported in Lilliana Progovač (1989), the only licenser for a negative polarity item is negation itself. The distribution of negative polarity items in different languages is an example of a fairly simple parameter, perhaps in its turn reducible to others. The parameter is semantic in the sense of my definition above, since the set of licensers in more liberal

languages such as English must be described in semantic terms, as first demonstrated in William Ladusaw (1979).

The broad class of possible semantic parameters divides naturally into two parts: languages may differ in the structure or extent of their lexica, or in the types of meaning that lexical combinations may have. The division corresponds to the classical division between lexical semantics, or the account of the meanings of words and other morphemes, and combinatorial semantics, or the account of how the meanings of larger constructions are built up from the meanings of their parts. Inputs of both types, the lexical and the combinatorial, are required to map any complex form onto its meaning. Thus in the elementary example *snow is white*, we require not merely the interpretations of *snow* and *is white*, but also the combinatorial principle that putting these expressions together constitutes an instance of predication; in the case of relative clause modification, as in *book that I read*, we require to state that the combination of the noun with the relative expresses a conjunction, effectively the condition on x that x is a book and I read x; and so on through the possible combinations that a language presents. Elements of the right type can generally be combined quite freely, with results ranging from the sensible to the ludicrous. Thus Chomsky's example *I almost had my wallet stolen* admits the interpretation that I was on the point of being certain of stealing my own wallet; for the combinatorics operates blindly, insensitive to the reasonableness of the outcome.

Human languages certainly differ in their lexical resources, not only in what words they have for objects, or verbs for actions and so forth, but also in their smaller grammatical units of the type traditionally called bound morphemes, realized by affixes such as English perfective *-en*, French subjunctive, etc. Do they also differ in their combinatorics? If they did, we would expect to find languages that differed in that the same combinations of words, with exactly the same individual meanings, gave rise to different meanings in the two languages. It is an obvious conjecture that such differences between languages do not exist; in other words, that every apparent

combinatorial distinction reduces to a set of distinctions each of which is either syntactic or lexical.

To see how this conjecture might guide research, consider the following example. In English, the relative scopes of expressions of generality, quantified Noun Phrases, are not strictly determined by their surface order; you often understand a quantifier in a different position from the one where it actually appears. Thus an example like (8) is ambiguous:

(8) A man went into every store

The meaning can either be: there is a man x who went into every store; or, for every store y there is a man x who went into y. Surface order is thus an imperfect guide to the logical arrangement of constituents. Katalin Kiss (1991), however, notes that in Hungarian this is not so; on the contrary, surface order determines relative scope.

It would be possible to interpret the difference between Hungarian and English as a difference in combinatorial parameters: following the discussion of Robin Cooper (1983), we might suppose that in Hungarian quantifiers are processed as they are encountered, but in English a quantificational object, such as the phrase *every store* in (8), could either be interpreted immediately together with the verb, or else 'stored' in the sense of Cooper until after the subject is processed. The storage, permitted in the combinatorics of English but disallowed in Hungarian, would give the interpretation where the quantifiers are processed inversely to their surface order, so that (8) can be assigned the interpretation that, for each store, there is a man that went into it. Although possible, the approach is unnecessary, as Kiss shows. In Hungarian, unlike English, elements can be moved into various fronted positions in a sentence, leaving variables behind. Thus (using English words) the sentence corresponding to (8) comes out as either

A man x, every store y, x went into y

or

every store y, a man x, x went into y

The Hungarian sentence therefore wears its logical structure on its face, in the sense that Hungarian carries out in the overt syntax an operation that is executed only abstractly in English. The combinatorics of the English and Hungarian is then exactly the same: the only difference between them in this respect lies in how much of it is actually heard.

Supposing now that although human languages differ lexically and syntactically they do not differ in their combinatorial semantics, we shall have to ask what types of semantic combinations are possible. We have already seen two types, namely the simple predication of *snow is white*, and elementary modification as in *book that I read*, which consists in taking the conjunction of the element *book* with the relative clause *that I read*. Predication is a special case of a verb's taking an argument, either subject, direct object, or indirect object; thus in *Mary gave John that ring*, we understand that the three-place relation that is the interpretation of the verb *give* takes for its arguments the expressions *John*, *that ring*, and *Mary*, in a fixed order. Elementary modification of nouns by adjectives, as in *printed book*, is of the same type as that by relative clauses, so that, for instance, the whole combination *printed book that I read* represents the conjunction

printed (x) & book (x) & I read x

Besides these, the combination of an expression of generality with a noun, as in *every store*, is a distinct type, of the sort familiar from logic as variable-binding; I will not consider it further here.

The simple inventory of types of combination leaves a host of constructions unspecified. Consider for instance the combination of verbs with adverbs of manner, as in *walk slowly*. The syntax is unproblematic: the intransitive V *walk* is combined with the adverb *slowly* to produce a complex intransitive Verb Phrase. The semantics, however, is left untouched.

There is indeed what may be called the brute-force method of deriving a kind of semantics, namely: regard the adverb *slowly* as interpreted by a function, call it f, that maps the interpretation of *walk* into the interpretation of *walk slowly*. This

method was advanced especially by Richard Montague a number of years ago, and owes its origin to the categorial grammar of Kazimierz Ajdukiewicz. Besides having a certain mechanical character, the brute-force method conspicuously fails to reveal a crucial point about the construction. Consider that it is true, and even obviously true, that all who walk slowly walk, and also that all who walk slowly do something that is slow, namely, walk. Neither of these propositions is a consequence of the method. To see that the first is not a consequence, observe that the sentence

John walks slowly

just has it that John satisfies some $f(W)$, where W is the interpretation of *walk*. Of functions of the type of f, some map their arguments into values such that whatever lies in the value lies also in the argument; but some do not. The function answering to *slowly* must be of the former kind, but that it is so does not emerge from the semantics adopted.

Rather than pursue the course that might be followed if the brute-force method is adopted, I turn instead to a proposal in an article by Donald Davidson (1967), that the combination of verb plus manner adverbial is in fact a case of simple modification, a conjunction of the verb with the adverb, where the entity to which the compound applies is an event. On this view, the verb *walk* expresses a relation *walk*(x, e), which applies to a thing and an event if the event is an event of walking by that thing. The adverb *slowly* is a predicate of events, in fact the same predicate as its counterpart, the adjective *slow*. To say that John walked slowly, then, is to say that there was a past event, e, such that it was a walk by John, and it was slow. The combination *walk slowly* is understood as a conjunction

walk(x, e) & slow(e)

with the position marked by e binding the two parts together.

Supposing that manner adverbs are predicates of events, the inventory of modes of combination of expressions need not at least for these cases be expanded to include, as in the brute-

force method, the application of functions that take predicates as arguments. Generalizing, we might suppose that predicates never function as arguments, though here there are a number of cases that need close discussion. Supposing that the generalization is correct, we would have arrived at a combinatorial semantic feature of human languages that is by no means characteristic of all imaginable languages, but serves to confine human languages to a particular semantic space. By surveying the semantic modes peculiar to human language, we would attempt to do for the principles of semantic combination the analogue of what is done for the principles of syntactic combination. As Chomsky remarked early on, we do not expect syntactic categories to combine in arbitrary ways, nor the existence of languages where, say, the negation of a simple declarative sentence is constructed by saying the next-to-last word of the sentence in a squeaky voice. Such possibilities, perfectly coherent in themselves, are excluded from the templates of possible human languages. Similarly, if predicate arguments are ruled out or even confined to certain particular locutions, we have in that respect an advance in comprehending the semantic nature of language.

I have said, following Davidson, that the manner adverbials do not comprise a novel method of semantic combination, but fall in line with other simple modifiers once we incorporate a position for events into the verbs that they modify. But there is another class of adverbials that resists this treatment. To illustrate these, consider the sentences below, discussed by J. L. Austin (1956; repr. Austin 1961: 147):

(9) He clumsily trod on the snail
Clumsily he trod on the snail
He trod clumsily on the snail
He trod on the snail clumsily

Concerning these, Austin writes: 'Here, in [the first two sentences] we describe his treading on the creature at all as a piece of clumsiness, incidental, we imply, to his performance of some other action: but with [the second two] to tread on it is,

very likely, his aim or policy, what we criticize is his execution of the feat.' In linguistic terms, the last two sentences in (9) contain manner adverbs: what we criticize is indeed 'his execution of the feat', in the sense that we say of the treading, an event *e*, that *it* was clumsy. Not so in the first two cases, where the meaning is rather that it was clumsy of him to tread on the snail. How do we understand the modification in these examples?

It is generally true that the position of adverbs correlates with the difference of interpretation shown in the examples in (9): the adverb is interpreted as a manner adverb if postverbal, and in some other way if preverbal (modulo, as Austin notes, comma intonation, and stylistic devices). Some discussions of the ambiguity have endeavoured to pin it on the scope of the adverb, i.e. on whether it takes in just the V, or perhaps the whole Verb Phrase, or even the sentence. The distinction would be between whether the adverb is bracketed together with just the V, producing the complex transitive V (*clumsily* (*trod*)), which then takes object and subject as arguments, or whether the adverb modifies the clause as a whole.

I have already rejected the account of manner adverbs that this solution envisages; but independently of that the proposal suffers from the formal deficiency that it does not bring out the equivalence that Austin hints at and I stated explicitly above, between *clumsily, he trod on the snail*, and *it was clumsy of him to tread on the snail*. To capture this equivalence, in a way already prefigured in Davidson's work, we should reject the idea that the adverb in Austin's first two examples is a modifier of the sentence. On the contrary, it is the main predicate, and it takes two arguments, namely the subject, and the proposition about the subject that he trod on the snail. The meaning then is that the subject is clumsy in that the proposition about him is true.

The adverb *clumsily*, interpreted as taking two arguments after the fashion of the adjective *clumsy* in *he was clumsy to have done that*, will be called a *thematic* adverb. As Austin goes on to say, referring to the examples above, 'Many adverbs . . . are

used in these two typically different ways', in our terms as manner adverbs and as thematic adverbs. The adjective is used in the same two ways, as besides saying of a person that he was clumsy to have done so-and-so I can also say that the action itself was clumsy. But, returning to the adverbs, why do different interpretations show up in different syntactic positions? The thematic adverb requires for one of its arguments a complete proposition. Hence, if no proposition, but only the verb and its direct object are in construction with it, as in the cases where it appears postverbally, it must be interpreted as a manner adverb, and not thematically. Conversely, the manner adverb requires to be in construction with a verbal complex, because it is simply an ordinary modifier of that complex, adding information about the event of the type over which the verb ranges. A syntactic execution of this theme is found in Lisa Travis (1988).

Human languages generally use the distinction between manner adverbs and thematic adverbs, or more precisely, given the analysis above, between adjectives of manner and adjectives expressing relations between persons and propositions, from which the adverbial distinction is derived. What I have been exploring is one respect in which the modes of combination of these elements with others in a sentence can be restricted to those that are attested in simple sentences, namely ordinary modification and the relation of predicate to argument. Continuing with the assumption that the principles of combinatorial semantics are universal, so that the only semantic parameters distinguishing human languages must come from lexical differences, I turn to a well-documented difference between language types, for whose analysis the above discussion of events and predications of events will be significant.

A striking distinction amongst language types, first discussed extensively at least in recent literature by Leonard Talmy (1985), lies in whether or not locative prepositions may be freely used to express the path as well as the location of motion. It happens that English goes in the more liberal direction, as seen for instance in the ambiguity of (10):

(10) The boat floated under the bridge

This can mean either that the boat, being under the bridge, floated around down there, or that it went under the bridge floating. That we have ambiguity and not vagueness is shown by adding temporal adjuncts, phrases that measure temporal duration, to (10). Thus (11) means only that it took the boat an hour to get under the bridge by floating there, but (12) means only that the boat did an hour's worth of floating while it was under the bridge:

(11) The boat floated under the bridge in an hour

(12) The boat floated under the bridge for an hour

Whereas the English is ambiguous, the corresponding construction in French (indeed in the Romance languages generally) and in, for instance, Korean is not ambiguous; that is to say, the locative preposition *under* only expresses position, not also path of motion. Thus the French (13) only means that the boat floated while it was under the bridge:

(13) Le bateau a flotté sous le pont

Sharpening the semantic problem, let us consider how the interpretations of (10) might be derived, taking *under the bridge* to be predicated of events, with either of the meanings that it has in English. It was one of the triumphs of Davidson's theory of the modification of verbs that it explained a number of obvious implications, e.g. that if the boat floated under the bridge, then it floated. The theory did this by positing that modifiers of verbs added information about the events of which they were predicated. It explained, therefore, not only why the obvious implications were correct, but also why they were obvious: for nothing could be more obvious than that if an event *e* is a case of floating, and also a case of being under the bridge, then it is in particular a case of floating. Applied to (10), we then have the interpretation shown in (14):

(14) float(the boat, *e*) & under (the bridge, *e*)

with the preposition *under* having either of its typical meanings. Now, the temporal adverbials are also predicated of events, giving their duration, so that (11) becomes (15):

(15) float (the boat, *e*) & under (the bridge, *e*) & in an hour (*e*)

with the preposition expressing motion to the space under the bridge. This expression is a conjunction of three elements, and so implies in particular the result of dropping the middle one. That result, translated back into ordinary speech, is (16):

(16) The boat floated in an hour

But now something has gone wrong, for although (16) is meaningful it has the wrong meaning. It does not mean that the boat got somewhere in an hour by floating there, but that it took an hour for the boat to get to floating.

The contrast between the phrases *in an hour* and *for an hour* is known to be a diagnostic for whether the predicate to which they attach is a predicate of pure activity, or rather of events that are conceived as having natural endpoints, *teli* in the sense of Aristotle. In general, the expression *for an hour* goes with activity predicates, the so-called atelics, whereas *in an hour* goes with predicates that establish endpoints, the telic predicates. In other work I have argued that the explanation of this distinction is as follows: the durational prepositional phrase (PP) *for an hour* simply measures the temporal extent of an activity or state. It is a simple predicate of events, and combines semantically with a main predicate after the fashion of manner adverbs. So, for example, to say (17) is to say that there was a floating of the boat, *e*, whose temporal measure was an hour:

(17) The boat floated for an hour

The durational PP *in an hour* is more complex. It measures, not the temporal extent of an activity, but rather the lapse of time between *two* events. Consider a typical telic predication, as in (18):

(18) Mary climbed the hill in an hour

In the expression *climb the hill* we have a process, namely going up the hill, and a telos, namely the attainment of the state of being on top of it. The predicate *climb the hill* thus ranges not just over one event, but over two, process and telos. The PP *in an hour* then measures the temporal distance between the onset of the process and the telos. Intuitively, then, (18) is true if just one hour elapsed between the time Mary started climbing up the hill and the time she reached the top.

Our problem was to explain the source of the ambiguity of the English *float under the bridge*, and also to explain its absence in the corresponding sentences of such languages as French and Korean. In the course of articulating this problem within the framework suggested by Davidson, we ran into what seemed to amount to a contradiction in that framework, stemming from the fact that whereas *float under the bridge in an hour* is a fine telic predicate, meaning that it took an hour for the boat to go under the bridge by floating there, the result of dropping the PP *under the bridge* gives the anomalous predicate *float in an hour*, whose meaning is that it took an hour to get the subject to float at all. Finally, we linked the distinction between the PPs *in an hour* and *for an hour* to whether the predicate to which they attached was simply an activity or rather consisted of an activity plus a telos, the phrase *in an hour* being constrained to measure the temporal distance between the two.

The solution to our problem that is virtually forced by these reflections is that, when the preposition *under* is taken in the meaning 'go under' the PP *under the bridge* is no modifier but in fact the main predicate of the construction. That predicate supplies the process, namely motion in space, and also the telos, namely the state of being under the bridge. Since both activity and telos are present, the PP *in an hour* is in order. What at first appears to be the main predicate, the V *float*, is now seen to have the interpretation of a manner adverb: to float under the bridge, in this sense, means as it were to go under the bridge floatingly; that is, *floating* is predicated of the activity-coordinate of the combination. In place of (15) we now have (19):

(19) float (the boat, e_1) & under (the bridge, e_1, e_2) & in an hour (e_1, e_2)

The contradiction for Davidson's view is now seen to have a simple solution. When we dropped the middle conjunct, *under the bridge*, we derived a form that was indeed implied by the form of the original sentence. The mistake lay in assuming that this form would be translated back into ordinary speech as the sentence *the boat floated in an hour*. On the contrary, *that* sentence will be understood by us as containing the pure activity predicate *float*, hence as anomalous excepting as it is interpreted as 'The boat took an hour to get to floating.'

The parameter that distinguishes English on the one hand from French and Korean on the other is now generally statable as follows: in English, but not in French or Korean, locative prepositions can function as main predicates. It is a lexical parameter, since it concerns the vocabularies of the language types. The parameter is no mere historical contingency, but points to a deep distinction in language design. The lexical differences between languages do not just consist in what words they happen to have, for languages may be so designed that certain items of vocabulary could not in principle be added to them. Thus it would not be possible for languages that, like Romance and Korean, encode path of motion within the verb, to add prepositions that express the path of motion as in the English *run into the room*; rather, one has to say, effectively, *enter the room running* so that the verbal element of the construction contains both activity and telos.

My discussion of the ambiguity of English *float under the bridge* relied crucially on the thesis that predicates that contain both activity and telos, a subclass of those that Anthony Kenny (1963) called *performances*, present two event arguments to the linguistic system, one for each aspect of the performance. There is in fact evidence that very simple aspects of modification cannot be understood without this assumption. One case is illustrated by the following example analogous to those discussed by David Dowty (1979: 252 ff.):

(20) Mary returned to the United States again

This sentence can be intended as saying that there was another return to the US (Mary had returned to the US before) or merely that Mary got back to the US (she may have left only once, on the trip from which she is said to return). Dowty's own explanation of this phenomenon involves what I called above the brute-force method, supplemented by complex semantic postulates. Given the assumptions I have made above, however, we can derive the ambiguity of (20) from the possibilities for what can be taken as the subject of the predication *again*. The word *again* is, first of all, a predicate of events, since one can say

(21) It has happened again

meaning thereby not that the same individual event recurred but rather that some event of the same type occurred previously (or, in the case of *it will happen again*, will occur subsequently). Now, *return* is telic and therefore by hypothesis presents two arguments, or an ordered pair of arguments (e_1, e_2) to the semantics. The event e_1 is that of Mary's progress toward the US border, and e_2 is the state of being in the US, on the presupposition that Mary was in the US at least once before. The ambiguity then results depending upon whether *again* takes for its subject the complex (e_1, e_2), in which case the sentence means that Mary, having returned to the US before, is returning again, or only e_2, in which case it means only that she is once again in the US.

In an interesting recent discussion Soonja Choi and Melissa Bowerman (1991) have attempted to determine just how rapidly children learning English on the one hand and Korean on the other catch on to the way their language is structured. It turns out that children master constructions involving path of motion at different rates in the two languages. Children learning English, where expressions like *up*, *down*, *in*, and so forth, whose sole function is to indicate path of motion, are extremely common both in number and in frequency of use, have mastered these words long before children learning

Korean can properly use their words (which of course are verbs rather than locative prepositions) expressing the same notions. The reason, the authors suggest, is that path information in Korean is normally presented inside the motion verb, whereas in English it may be and usually is presented separately: English has *go in*, whereas Korean has only a verb meaning *enter*, *go out* where Korean has only *exit*, and so forth. Their tentative conclusion is that the structure of the ambient language encourages the rapid development of the concepts that it explicitly represents, and that 'children are sensitive to the semantic structure of the input language virtually from the beginning' (Choi and Bowerman 1991: 117–18).

Experiments such as these have serious implications for the branch of developmental psychology that studies first-language acquisition, pointing as they do to the possibility that the problem of explaining language acquisition may turn out to be partly trivial, partly infinitely difficult. The problem will be trivial if almost all of what there is to be known must be present before anything describable as learning—that is, as inference from data to theory—can begin. But it will be infinitely difficult if there is no learning at all. Just how things will turn out is a matter of conjecture; but it is noteworthy that there is no account at all, apart from continuous small miracles, of the acquisition of basic vocabulary even for objects given in perception, still less an account of our grasp of the vocabulary responsible for logical and analytic connections.

Thus far I have argued that, although there are no grounds to believe that there are combinatorial semantic parameters, there are both major and minor lexical semantic parametric differences between languages. In the course of that discussion I endeavoured to bring out some features of the semantics of simple sentences that, although they might at first escape notice, were easily brought to full understanding. The final part of my discussion will turn to an area where there are again semantic parameters of the lexical type, but also a complication in trying to say just what the meanings of the sentences containing the expressions in question are.

English and many other languages (but not, for instance, Hebrew or Japanese) permit the embedded past tense of a reported thought or utterance to be evaluated as non-past with respect to the time of that thought or utterance. Thus a sentence like (22) is ambiguous in that it can be a past-tense report of Mary's present-tense speech, or of her past-tense speech:

(22) Mary said that a unicorn was walking

In Hebrew and Japanese, only the second option is possible: the Hebrew or Japanese analogues of (22) are true only if Mary at some past time *t* said something whose content was: A unicorn walks prior to *t*. In English, however, the embedded past can be effectively deleted, so that (22) can also be true if Mary said something at *t* whose content was: A unicorn walks at *t*.

How should this ambiguity be represented? Following in part discussions by Mürvet Enç (1987), Timothy Stowell (1993), and Dorit Abusch (1994), let us suppose that tenses express temporal relations. I take these to be relations between events as elaborated in Higginbotham (1994), so that the morphological feature +Past is effectively a two-place predicate

$$e_1 < e_2$$

A simple past-tense utterance, e.g., *Mary spoke*, assigns the utterance itself as the value of e_2, and generalizes over e_1, so that the utterance as a whole means

$$(\text{For some } e)\ [\text{speak (Mary, } e) \ \&\ e < u]$$

Likewise, suppose that the feature –Past is a two-place predicate

$$e_1 \text{ overlaps } e_2$$

So that an utterance *u* of the simple sentence *Mary is speaking* means

$$(\text{For some } e)\ [\text{speak (Mary, } e) \ \&\ e \text{ overlaps } u]$$

Suppose now that the second argument of the embedded past tense in (22) has taken on the value of the first argument of the superordinate past tense. That gives (23):

(23) (For some e) [say (Mary, α, e) & $e < u$ &
α = the proposition that for some e', walk (a unicorn, e') & $e' < e$]

The embedded proposition that I, the speaker, say that Mary said is then a true report of her speech if amongst her past utterances there is one with that content; namely, that a unicorn is walking prior to that very utterance of Mary's itself. It follows that we have captured the truth conditions of one meaning of (22), the one that is available alike in English, Hebrew, and Japanese. For the second meaning, we follow traditional grammar in taking the embedded past as a 'copy' of the superordinate past. The embedded clause is then –Past, but its second argument continues to be anaphoric to the first argument of the superordinate clause. In that case, the proposition said to be the content of one of Mary's past utterances is

For some e' [walk (a unicorn, e') & e' overlaps e]

The speaker who is reporting Mary then speaks truly if amongst Mary's past utterances e there is one whose content would have been expressed then in English by 'A unicorn is walking'.

A feature of the analysis just presented is that every simple tensed utterance, the utterance *Mary is speaking* as said now by me, for example, can make reference to that utterance itself, not just in the incidental sense that what I say when I say *Mary is speaking* is correlated with the time at which I said it, but also in the robust sense that my utterance itself is a constituent of the proposition that I am expressing. Those familiar with some of the literature on token-reflexive propositions in the sense of Hans Reichenbach will recognize this move as a familiar one, although the present execution is different; it is close too to Robert Stalnaker's (1981) discussion of what he calls 'diagonal propositions', though again there are significant

differences. Well, there is no logical bar to having one's own utterance as a constituent of the thought expressed by that very utterance. But what has been said of utterances should apply as well to episodes of thinking and states of the thinking subject, for English sentences reporting thoughts and wishes show the same patterns of sequence of tense as indirect discourse. Thus if Mary says (24):

(24) Higginbotham thought that a unicorn was approaching

she speaks truly (on one interpretation) if at some time in the past I thought (what I would express to myself as)

A unicorn is approaching

and this thought therefore has the structure of the proposition that

For some e' [e' is an approach of a unicorn & e' overlaps e]

We must therefore conclude that thoughts of all sorts may have episodes of thinking as part of their content.

Is there any direct evidence for this view, or is it merely an artifact of the semantics proposed for sequence of tense? I believe that there is much to be said in favour of the thesis that it is no artifact, but an essential feature of our thoughts. For, when we have thoughts about the present, our temporal reference may be merely to the present time, or to the present conceived as such; and the nature of the temporal reference matters to the thought. To adapt an example due to A. N. Prior and recently discussed by John Campbell,[1] suppose that I am leaving the dentist's office after undergoing a root canal. I may think, 'Thank goodness *that's* over', referring to the painful operation I have just endured. My thought (25):

(25) The root canal is over

[1] Contribution to a symposium, 'Foundations of Autobiography', at the meeting of the European Society for Philosophy and Psychology, Paris, Aug. 1994.

justifies my feeling of relief. Supposing it is 4 p.m. on 31 October 1994, the thought (26)

(26) My root canal is over as of 4 p.m., 31 October 1994

would not bring relief, unless indeed I independently knew that it was now at the latest that time on that or an earlier date. Supposing it is 4 p.m. on 31 October, my thought that the root canal is then over makes reference to the present, in the sense that it speaks of my root canal's being over before what is in fact the present time. But it does not make reference to the present as being present. Unlike the thought (25) it does not justify my sense of relief. It is therefore a different thought.

The thought indicated in (26) is to be construed as tenseless, that in (25) as tensed. Following the lead suggested by sequence of tense in reporting speech and thoughts, suppose that the tensed thoughts contain a reference to the episodes or states of thought whose nature is being given. Tensed thoughts are then reflexive in the sense that some of their constituents make reference to the state of the thinking subject. If e is the episode of my thinking with a sense of relief that my root canal is over, the thought that I think is (27):

(27) (For some e') [e' is the situation of my root canal's being over & $e' < e$]

What goes for the present and the indexical *now* goes also for the past and future, and for at least certain interpretations of the indexical *then*. For me to have the thought that I once ate risotto in Milan is for me to think that there is a situation of my eating risotto in Milan before that very episode, or the onset of that very state; for me to have the thought that I will eat risotto in Milan is for me to think that there will be such a situation after that very episode; and so on. What goes for thoughts understood as episodes of internal affirmation or states of belief goes also for desires, wishes, regrets, knowledge, and so forth.

If tensed thoughts are distinguished from tenseless ones in the way I have suggested, then certain of the differences

between them that matter to us follow immediately. I am relieved when I think *my root canal is over* because I locate my root canal in my past; I look forward to visiting Milan because I desire something conceived of as in my future, and I believe I am going to get it. The passions of relief and anticipation, like the state of regret, can only be directed toward thoughts that are themselves tensed or else supported by tensed thoughts, which locate the time reference of the untensed thoughts with respect to the thinker's present state. Tenseless thoughts cannot substitute for tensed thoughts.

Against the view I have just outlined, it may be observed that there are a number of cases where we do not want to treat my episode of thinking as part of the thought itself. Thus consider that the dentist knows as well as I do that my root canal is over. The dentist may be presumed not to know (and for that matter not to care) whether I happen to be thinking anything at the moment, so that what the dentist knows does not make reference to my thinking; but then since the dentist and I know the same thing, my thought considered as the common knowledge of me and the dentist cannot make reference to it either.

On the other hand, the dentist knows the elementary psychology of dental patients, and may know, thinking of me:

The patient is relieved that his root canal is over

In that case, the dentist attributes to me a thought belief in whose truth brings me relief; and the dentist knows this. This thought, as we have seen, is more than the simple thought that the root canal precedes the present time.

Examination of the temporal perspectives of our thoughts, the fact that a present-tense thought is not just about the present time, but represents it as present, provides independent support for the theory of sequence of tense as I have outlined it here, and for the basis of the distinction between languages like English and languages like Hebrew and Japanese; that is, there is support for the idea that the tenses must be understood as full temporal relations between events. Further elabo-

ration of the system suggests that the lexical parameter distinguishing the language types comes down to a peculiarity of English, that the subordinate present tense is not allowed to shift its reference through a superordinate past tense; but the details here would take us too far afield.

In this discussion I have formulated some general and some quite specific features of a programme of research that would seek to arrive at a theoretical understanding of the relations between syntactic form, including forms of words, and meaning in human languages. For its general features the programme relies upon the proposition that meaning is context-independent, and that semantics is properly viewed as a system of knowledge that is put to use in all manner of behaviour, rather than as a set of practical abilities or habits. Specific features of the programme involve the assumption that all parameters are lexical, and that all human languages make use of the same, highly restricted, repertoire of combinatorial devices. The limits on combinatorics led us away from the simple formal theory of adverbial modification toward Davidson's account in terms of events; but then, I have suggested, there is independent support for that theory. I have also argued that for a significant set of sentences, or more precisely for potential utterances of those sentences, or thoughts that might be expressed by them, the episodes of speaking or thinking themselves enter as part of the meaning, and are a crucial ingredient in thoughts that incorporate the thinker's perspective on the world. This interaction between conceptual issues, such as what it is to think about one's own location in time, with problems of linguistic semantics such as the sequence of tense phenomena gives some hope that continued research into the expression of thought in language will help to reveal to us the basis not only for our power to express thoughts, but also the nature of the thoughts that we express.

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