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MODEL THEORETIC SEMANTICS OF PERFORMATIVES *

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Existing proposals for the treatment of performatives in Montague's framework¹ share the common feature of assimilating performatives to propositions. In the light of the fact that model theoretic semantics takes the descriptive function of language as a point of departure, this procedure may seem only natural; nevertheless, it does not seem to capture the intuition I believe to underlie Austin's theory.

Rather than attributing the peculiarities of performatives to nothing but conventions of use, in this paper I approach the problem from the other way round: from what we know about the use of performatives I try to work out what their corresponding meanings can be in terms of model theory.

* I greatly benefited from comments on earlier versions of this paper, made by Ferenc Altrichter, Harry Bunt, and Zeno Vendler.

¹ For instance, David Lewis, General Semantics, in: Davidson and Harman (eds.) Semantics of Natural Language, Reidel, 1972. and Roland Hausser, Surface Compositionality and the Semantics of Mood, in Groenendijk and Stokhof (eds.) Amsterdam Papers in Formal Grammar, Vol. II., Centrale Interfaculteit, Universiteit van Amsterdam, 1978.

Naturally, one may not expect that model theoretic semantics should incorporate some particular theory of speech acts, it can only be expected to grasp some relevant facet of the phenomenon those theories are concerned with. Explicit performatives play a distinguished role in speech act theories (both historically and conceptually)² and it is the "performative phenomenon" that seems justifiable to belong within the scope of model theory. As a first step, the performative phenomenon can be characterized as follows: formally declarative sentences divide into two groups with respect to what happens when they are uttered. In saying 'I congratulate you' it is possible to perform the act of congratulating, that is, the very act referred to in the sentence, whereas in saying 'I am walking' it is impossible to perform the act of walking. It would of course be an illusion to believe that theory can be completely peeled off this phenomenon. The very fact that one finds it remarkable is already a consequence of some theoretical background. Therefore, we first have to show that Austin's original observation is not so alien to model theory that the latter may not find remarkable what he found

² See Zeno Vendler, Res Cogitans, Cornell University Press, 1972. p. 8: "We may recall that Austin's investigations begin with an attempt to draw a distinction between "performative" and "constative" utterances. As this task cannot be accomplished to his satisfaction, he develops the theory of illocutionary acts, that is, of illocutionary forces accompanying all "happy" or "successful" utterances. In this new perspective the performative-constative distinction fades away and what he previously called "performative" utterances retain no special status except for a stronger emphasis on some illocutionary force or another. Nevertheless, and exactly because of this emphasis, the intuitive notion of an illocutionary act (footnote 2 continued)

so, and secondly, we have to point out to what extent Austin's explanation is compatible with model theory. These will be the tasks of Section 1. In analysing Austin's texts I will not try to be faithful to the history of science, I will only investigate his claims as challenges to present-day model theoretic semantics. My main point will be to draw a sharp line between the semantic and pragmatic aspects of performatives and thereby discover a gap in Austin's treatment. This will in my view naturally lead to the proposal in Section 2, that is, to treating performatives as denoting changes in intensional models. The rest of Section 2 will be concerned with the status of felicity conditions and a tentative extension of Montague's The Proper Treatment of Quantification in Ordinary English.

In this paper I do not offer an exhaustive analysis of performatives in Montague's framework. I concentrate on a few problems I believe to be both performative-specific and common to all performatives. As regards to any particular sentence, I let the independent results of the theories of speech acts and grammar have the final word of judgement.

Section 1

1.1. Austin's distinction revisited
 In "Performative Utterances" Austin introduces his topic as follows: "I want to discuss a kind of utterances which looks like a statement and, grammatically, I suppose, would be classed as a statement, which is not nonsensical, and yet is not true or false (...) if a person makes an utterance of this sort we should say that he is doing something rather

(footnote 2 continued) -cutionary act remains dependent upon the previously described characteristics of performative utterances." (Emphasis supplied)

than merely saying something (...) in all these cases it would be absurd to regard the thing I say as a report of the performance of the action which is undoubtedly done -- the action of betting, or christening, or apologizing. We should rather say that, in saying what I do, I actually perform that action (...). Now these kinds of utterances are the ones that we call performative utterances."³

As opposed to my innocent characterization of the performative phenomenon, as given above, the first theoretical surplus in Austin's text is the immediate opposition of performativity and truth-falsity. The notion of truth playing an important role in model theory as well, Austin's observation counts as an obvious challenge. The status of his distinction needs to be revised, however, as it is by no means unambiguous what he means by the term "utterance", namely, whether he thinks of what we utter or of the act of uttering it. The first interpretation seems to be supported by the fact that in Austin's view, "utterances" are grammatically (i.e. syntactically) classifiable, further, that some "utterances" are statements and can thus be true or false, and finally, by his expression "the thing I say". On the other hand, the act-interpretation is supported by the fact that the performative character of an utterance can be demonstrated in a speech situation ("in saying what I do, I actually perform that action")⁴.

³J.L. Austin, "Performative Utterances," in Philosophical Papers, Oxford, 1976. p. 235.

⁴See also the following loci in How to Do Things with Words, ed. by J.O. Urmson, Oxford, 1962. p. 6: "What are we to call a sentence or an utterance of this type?² I propose to call it a performative sentence or a performative utterance, or, for short, a 'performative' (...)" (footnote 4 continued)

This ambiguity - which leads to an ambiguity between the levels of semantics and pragmatics - can be traced in all his works, although their overall spirit is in the direction of pragmatics. This ambiguity is apparently rather irrelevant for Austin himself, it is most relevant to us, however. The scope of model theoretic semantics only includes the relation between expressions and things in the models of the world, where those models only contain constructs necessary for interpreting the literal meanings of expressions. The question of what happens in particular situations in which those expressions are uttered belongs to the scope of the theory of language use, or pragmatics⁵. Although at present we know of no full-blown pragmatic theory based on model theoretic semantics and using similarly advanced mathematical tools, we can form a conception of it on the basis of less mathematical-minded explorations. I imagine that this pragmatics has to account for the characteristics of language use taking into account both the communicative function and the social embedding of language but, most importantly, has to rely upon the abstract linguistic system. Semantics in

(footnote 4 continued) ²'Sentences' form a class of 'utterances', which class is to be defined, so far as I am concerned, grammatically"

p.11: "In no case do we say that the utterance was false but rather that the utterance - or rather the act¹, e.g. the promise - was void (...)"

¹We shall avoid distinguishing these precisely because the distinction is not in point."

⁵The kind of indexical pragmatics Montague devised will fall within semantics in this sense. In fact, no matter how many tuples indices should be as long as the "model of the world" does not involve self-contained models of the internal structure of the speech situation.

turn has to play in the hands of pragmatics: it has to define the meanings of expressions in a way which explains the possibilities of their uses.

This requirement is already satisfied in the case of statements. It is a par excellence semantic property of the sentence 'I am walking' that it can be true or false. Regardless of whether this sentence is ever uttered, its meaning can be defined by specifying which states of affairs it is true of and which of them it is false of. This kind of treatment is motivated by the underlying conviction that the relation of this sentence to facts of the world is descriptive (truth and falsity are but auxiliary notions for expressing this). The primary end to which one may use this sentence when uttering it is to perform an act of describing, or reporting. Now, when Austin claims that "performative utterances" differ from statements in that they cannot be true or false one might expect that he is going to point out some par excellence semantic difference since, obviously, the one kind of semantic characterization (i.e. the potential of being true or false) ought to be opposed to another one. Surprisingly enough, however, aside from giving a possible list of syntactic characteristics of "performative utterances" Austin only characterizes performatives pragmatically (as he only concentrates on speech acts themselves). As long as the distinction of statements and performatives is maintained, truth or falsity is opposed to felicity or infelicity, that is, a semantic qualification to a pragmatic one. It needs to be emphasized, however, that this level switching is by no means explicit in Austin as this switching is only possible thanks to the non-distinction of semantics and pragmatics (which is facilitated by the ambiguous use of the term "utterance").

In spite of this inevitable asymmetry in the distinction of statements and performatives, Austin's claim still presents a challenge for model theory. If we project the facts of use back to the abstract linguistic system to a permissible (and

necessary) extent, we must be able to explain why 'I congratulate you' and 'I am walking' can be (or, are bound to be) used so differently. It seems reasonable to accept that 'I congratulate you' and its brothers cannot be called true or false. Nevertheless, the question for model theory now is how to fill the above discovered gap in semantics; in other words, how to characterize 'I congratulate you' at the level of pure semantics then.

1.2. Austin's objection revisited

Rather than to proceed to the actual proposal directly, an excursus seems to be in order here. When setting out to base an argument on the distinction of statement and performative one must not forget about the fact that, having elaborated it, Austin also did his best to raise doubts with respect to this appealing distinction. Therefore it needs to be shown that, at least from our particular point of view, Austin's conclusion that there is no essential difference between "performative utterances" and the rest is not inescapable.

When discarding the original distinction Austin observes that all kinds of sentences and non-sentences can be "performative utterances"; that "utterances" carelessly qualified as performatives are not always performative; that the classification of the type 'I state that...' is paradoxical; that truth and falsity are but gross labels and statements can also be infelicitous etc. It would be far too lengthy to consider each of these points in detail so I merely indicate the main scheme of my argument. It appears that, similarly to the case with setting up the distinction, in arguing against it Austin continues to make use of the non-distinction of semantics and pragmatics.

This tendency is most perspicuous perhaps in the treatment of non-explicit performatives. The expression 'Bull' or 'The bull is to charge' can in certain cases be uttered with the same force as the expression 'I warn you that the bull is

to charge', nevertheless, this sameness of force can only be a property of utterances in the act-sense whereas we find no trace of such an equivalence in the meanings of the corresponding expressions. Tested against the criterion of "in saying what I do, I actually perform that action" as well, saying what I do... will turn out to be performative only 'I warn you that...' neither say what I do nor perform the action (?) that bull, and similarly for the other example).⁶ In order to disambiguate the term "utterance" I shall from now on use the term "performative sentence" for expressions called "explicit performatives" by Austin. The act of uttering those expressions may still be called a "performative utterance" but in the case of uttering other expressions this term seems either unjustified or simply tautologous.

It may also be useful to dwell on the infelicities of statements for a while, in order to demonstrate that they do not obscure the intended distinction, either. The violation of presuppositions can be handled by any not purely two-valued logic at the very level of semantics. The question whether a statement (e.g. 'France is hexagonal') is exact or rough presents no unsolvable problem either. One possibility is to use fuzzy logic, where the truth value of a statement specifies the measure of its truth. It needs to be emphasized,

⁶The relation between certain explicit performatives and certain non-declaratives is a slightly different matter since the sameness of force in the case of 'I order you to leave' and 'Leave' is not so much a function of the particular speech situation but a systematic phenomenon. Still, their equivalence is also merely pragmatic. For a treatment of imperatives and interrogatives see Hausser (1978), whose analyses I fully accept although my proposal for explicit performatives is at variance with his.

however, that model theoretic semantics assigns truth values to sentences not with respect to actual reality but with respect to its mathematical models. It is one question whether France is really hexagonal and another is whether we can model it so. In case we choose to, this sentence will be true even in usual two-valued logics. Such a distinction between reality and its models is not merely playing with mathematics, however: it corresponds to what Roman Jakobson expresses by saying that linguistic signs refer to an internalized world of human experiences. Finally, it seems to be a matter of pragmatics whether we actually believe what we say and whether we are entitled to saying so (e.g. to say that someone else is not well!).

Austin's programmatic conclusion was: "stating something is performing an act just as much as is giving an order or giving a warning (...). What we need besides the old doctrine about meanings is a new doctrine about all the possible forces of the utterances".⁷ As it will have become clear from what has been said above, I do agree that all cases of saying something should be studied as acts. Which, however, does not amount to also agreeing to abandoning semantics for the sake of pragmatics and, further, I see no reason why we should not distinguish between performative sentences and other expressions in semantics. Assuming that the lack or presence of each of the following properties can be decided on independent grounds (for any language and any expression), I take the class of performative sentences to include formally declarative sentences which (i) contain a so-called performative verb, that is, which are explicit, (ii) whose syntactic form can be characterized, language-specifically, with the tense, aspect, mood, person etc. of the performative verb and with the nature of its possible comple-

⁷Performative Utterances, p. 251

ments (also admitting that this syntactic characterization need not be unique and therefore performative sentences may be homonymous with some statements, which causes no troubles in interpretation as long as we provide different derivations for the performative and the constative versions), and (iii) to which the "in saying what I do, I actually perform that action" test applies.

Finally, it should be noted that I cannot accept the second part of Austin's program, as cited above, on its literal form. While condemning the old doctrine about meanings for being fully descriptive, Austin does in fact rely upon it as it is clear from his notion of locutionary meaning. Locutionary meaning, however, cannot exhaust the full meaning of a performative sentence, only relates certain parts of it. It seems that what we need beside that old doctrine about meanings is not only a new doctrine about forces but also a smaller-scale new doctrine about the meanings of performative sentences.

Section 2

2.1. Denoting changes

Recall that Austin opposed the active character of performatives to "merely saying something". In what sense can this opposition be regarded as valid, considering that all speech acts have an influence on the speech situation (factors like the hearer's knowledge or state of mind also included under this general label)? To describe some state of affairs is merely saying something in the sense that it leaves the state of affairs in question untouched. Whereas all speech acts are "active" or "performative" from a pragmatic point of view, only the making of an explicit performative utterance has the additional property that the primary influence it has should be described in terms of its literal content. In

other words, explicit performatives are active in relation to the matters their literal meanings are concerned with, and constatives (or other expressions) are by no means active in this sense. This in turn suggests that the unique active nature of explicit performatives is a semantic property.

We can say in general that an act is something that brings about some change. Speech acts in general bring about changes in the speech situation and should therefore be characterized in those terms, which I call pragmatic terms.⁸ At the level of semantics, however, models of the world only picture things our expressions refer to. Since explicit performatives are active in this very relation, I propose that performative sentences should denote changes in the models. In intuitive terms we can say that the literal meaning of a performative sentence specifies how the world would change if the sentence were uttered (under appropriate circumstances).

More precisely, I take a change to be a transition from one state of affairs into another. Correspondingly, the denotation of the sentence 'I congratulate you' at an index a is a transition from a to another index b. The nature of this particular transition, or change, can be characterized by the fact that b is such that there it is true that the person denoted by 'I' has congratulated the person denoted by 'you'. Note that the sentence denotes the change and not the resulting state of affairs b and is therefore crucially different from statements. Yet, the above characterization of b preserves all its "descriptive content"⁹.

⁸ See for instance H.C. Bunt, Dialogue Analysis and Speech Act Theory, Institute for Perception Research, Manuscript no. 330/II. Eindhoven, 1978.

⁹ I assume that b follows a in time and that they are identical, (footnote 9 continued)

In order to incorporate this proposal into Montague semantics we have to make an important alteration on currently used models of intensional logic. Those models are static - there are no changes in them. This may sound surprising: how is Montague then capable of accounting for such everyday sentences as 'Peter enters' - does this sentence not denote some change? Here the difference between reality and its models needs to be emphasized again. In reality, entering is a change and standing still is not; Montague, however, neutralizes this difference in the course of modeling when he captures the meanings of both of the verbs 'enter' and 'stand still' with (intensions of) sets. Those sets are quite alike in a mathematical sense; only when we confront-model and reality does it turn out that the set of those entering is a set of moving people while the set of those standing still is not. This procedure is justified since language itself seems to neutralize this difference, at least to a certain important extent.¹⁰ Nevertheless, language does not seem to neutralize the difference between 'I congratulate you' and 'I am walking' (or, 'I am congratulating you') in the same sense. The treatment of performative sentences may thus be a good reason for making intensional models dynamic, that is, to allow for changes to happen, not only in reality (as they do in the case of entering) but also in the models of reality.

Changes in intensional models can be represented by _____ (footnote 9 continued) except for the result of the change in question. Note that in the present formulation performative sentences are not self-verifying.

¹⁰That both the qualifications "certain" and "important" are necessary becomes clear if we think of accomplishment verbs (cf. D. R. Dowty, Toward a Semantic Analysis of Verb Aspect..., Linguistics and Philosophy 1977/1).

functions whose domains and ranges both contain (indices of) states of affairs. Such functions map states of affairs into others and are thus mathematical representatives of the notion of change as sketched above. The necessary extension of intensional logic (as a mere mathematical possibility) has already been introduced by Daniel Gallin¹¹. In distinction to the original definition by Montague, in which \underline{s} was not a type, Gallin's definition of types is as follows:

$$(1) \quad e, t, s \in T^1 \\ (11) \quad \alpha, \beta \in T^1 \rightarrow \langle \alpha, \beta \rangle \in T^1$$

By introducing \underline{s} as a type it becomes possible to define functions of type $\langle s, s \rangle$, which serves as the type of possible denotations of performative sentences. (Obviously, the term "sentence" should rather be reserved for truth value denoting expressions but I assume that the maintenance of this jargon will not be confusing here.) Correspondingly, the meaning of a performative sentence is represented by the intension of all possible changes it denotes and is of type $\langle s, \langle s, s \rangle \rangle$.¹²

2.2. The status of felicity conditions

The first problem arising in connection with this proposal is concerned with the initial index \underline{a} . Is it necessary to impose restrictions on the domain of the change function and if so, then what kinds? The confrontation of speech act theory

¹¹D. Gallin, Intensional and Higher Order Modal Logic, § 8 Two-sorted type theory, pp. 59-63, Elsevier, 1975.

¹²The idea of accommodating changes in intensional models is by no means unprecedented in literature. The semantic effect of state-switchers and predicate transformers used by van Emde Boas and Janssen (Montague Grammar and Programming Languages, in Groenendijk and Stokhof (eds.), 1978) is similar to that of our change functions; nevertheless, those being operators, the corresponding changes cannot be denotations of expressions.

and model theoretic semantics makes the need for such restrictions at least questionable. Nevertheless, I will not take sides here, only indicate my doubts.

It is necessary to impose restrictions on a only if we think that there are states of affairs from which there can be no transition to any other via 'I congratulate you' or 'I promise to come' etc. From this claim there follow two conclusions, namely, (i) restrictions on a may be concerned with felicity conditions, and (ii) the theoretical status of those restrictions may be similar to that of presuppositions. Presuppositions are usually handled by excluding states of affairs in which the presuppositions of the statement are not fulfilled from the domain of the function that assigns truth values to the sentence. The situation may be similar in our case: we might restrict the domain of the change function so that it may not turn states of affairs lacking certain properties into others.

When trying to handle felicity conditions similarly to presuppositions the first problem we are faced with is this: the fulfilment of presuppositions is necessary for a statement even to be false - are there (some) felicity conditions that are necessary for the speech act even to be infelicitous?

Studying Searle's analysis of promising¹³ we find that he makes no such a distinction. Nevertheless, although he merely qualifies preparatory conditions as sine quibus non for felicitous promising, this class of felicity conditions might perhaps be taken as necessary conditions for a promise to be infelicitous as well. Namely, the two preparatory conditions of promising in Searle's view are (roughly) that one may only promise something that is good for the addressee, and that one may only promise something that would not obviously happen anyway. Now we might say that these two condi-

¹³J.R. Searle, Speech Acts, Cambridge, 1970. pp. 57-62.

tions are also necessary for making an infelicitous (e.g. insincere) promise. In this case we should regard insincere promises as promises (although infelicitous ones) whereas "promises" concerning bad or obviously happening things will not be regarded as promises at all. If we subscribe to this view then in our framework, at the level of pure semantics we can proceed as follows. Possible preparatory conditions of the speech act will be represented by restrictions on the domain of the change function (indicating that the change in question is impossible to conceive of unless the initial situation conforms to those requirements)¹⁴. In case those requirements are satisfied, the change function corresponding to 'I promise that ...' will turn a into another b (indicating that, by uttering that sentence, the act of promising can be performed, whether happily or unhappily). What Searle calls sincerity and essential conditions, however, need not be treated in semantics since they are conditions only for felicitous speech acts and insofar as they are given in the very notion of 'promise'.

Note however that only an independent analysis of speech acts may prove that preparatory conditions (or some other felicity conditions) are really necessary for infelicitous promising as well. Given the possibility that the results of such an analysis may be negative, we may have already taken the wrong path in trying to treat some of the felicity conditions, in analogy to presuppositions, as restrictions on a.

The consideration of a further question may cast another kind of doubt on the whole procedure of imposing restrictions

¹⁴These restrictions would seem possible to handle similarly to stage-descriptions in Hausser (1978). Note however: that questions like what can be good for the addressee are very difficult to decide without reference to the actual speech situation, which may go beyond what those stage descriptions are supposed to take care of.

on 2. Namely, several scholars have suggested that felicity conditions are already included in the lexical meaning of the performative verb¹⁵. Since however those suggestions have been associated with assimilating performative sentences to propositions, it is not uninteresting perhaps to point out that their claim seems to hold even if explicit performatives are assigned a special semantic status. Interestingly enough, researchers who find the felicity conditions of 'I promise that...' or 'I congratulate you' so complex and necessary to study closer never devote much attention to the "special truth conditions" of 'Peter is congratulating Mary' or 'Yesterday Peter promised that...', although it is inevitable that in deciding whether Peter is in the set of those who are congratulating Mary etc. one should consider the very same questions. That is, the problem of felicity conditions is not specific for performative sentences but arises in connection with all occurrences of the verb. Which suggests that felicity conditions are indeed included in the lexical meanings of performative verbs, and therefore it is only necessary to make them explicit in word-semantics and (possibly) in pragmatics, whereas sentence semantics (which is the very object of model theory) only has to take an implicit recognition of them.

2.3. A grammar of performative sentences

One of the crucial arguments for treating performatives on a par with statements has been that they belong to the same syntactic paradigm. In the light of this claim any attempt to assign some special semantic status to performatives seems to be doomed to failure as soon as one wishes to incorporate it into a grammar. That is, such an attempt is liable to at

¹⁵E.g., Hausser (1978) and J. Allwood, A Critical Look at Speech Act Theory, in Ö. Dahl (ed.) Logic, Pragmatics and Grammar, Dept. of Linguistics, University of Göteborg, 1977.

least one of the following grave errors: (i) the violation of a significant syntactic generalization, by deriving performative sentences completely differently from statements, and (ii) the violation of the compositionality principle, by assigning interpretations to performative sentences in an arbitrary fashion, i.e., independently of their derivations. It seems to me, however, that if there is an independent motivation for distinguishing between statements and performatives in semantics then these flaws must be possible to be avoided somehow. Therefore I present a tentative (and sketchy) extension of PTQ, enriched with change denoting performative sentences. It needs to be emphasized that I do not regard this solution as the solution to the problem; its presentation rather serves to indicate along which lines I imagine the task to be possibly solved.

Having surface structures in mind we may say that performative sentences constitute a subset of declarative sentences. In other words, there are sentence structures that can be structures of both statements and performatives (e.g. the ones whose main verb is in the simple present etc.) whereas other structures can by no means be structures of performatives (e.g., the ones whose main verb is in the present progressive etc.). I take these facts to be the ones that a possible grammatical framework has to account for. This suggests that we must distinguish between syntactic rules (or operations) that allow for the resulting sentence to be performative and those that do not. Naturally, this could only be done if we had both a complete English syntax and an exhaustive taxonomy of performative sentences at hand; nevertheless, even now we may point out that the operations in Montague's S17 (rules of tense and sign) are, for instance, reasonable candidates for being elements of the set of those operations that are responsible for the fact that the resulting sentence cannot be performative (regardless of whether it has a so-

called performative verb in the appropriate position).
 All this also suggests that some derivations can, up to a certain stage, be derivations of either performative sentences or statements and it is the application of an n th syntactic rule that cancels the possibility that the result be performative.

Let us now consider the following extension of English syntax. Cat, or the set of syntactic categories, is to be the smallest set such that

- (1) $e, t, s \in \text{Cat}$
- (2) If $A, B \in \text{Cat}$, then $A/B, A//B \in \text{Cat}$
- (3) $\frac{s/s}{t} \in \text{Cat}$

The introduction of s among the elements of Cat is already necessitated by the claim that performative sentences denote functions of type $\langle s, s \rangle$. The new category $\frac{s/s}{t}$ (which I will abbreviate as \bar{t}) behaves exactly like simple t and certain syntactic rules in fact reduce it to t . Traditional categories like intransitive verb phrases and term phrases are now all redefined in terms of e 's and \bar{t} 's (\bar{t}/e and $\bar{t}/(\bar{t}/e)$, respectively). \bar{t} -reducing rules will be of the form as S17':

$$S17'. \text{ If } \alpha \in \bar{t}/(\bar{t}/e) \text{ and } \delta \in \bar{t}/e \text{ then } F_{14}(\alpha, \delta) \in \bar{t},$$

where $F_{14}(\alpha, \delta) = \alpha \delta'$, and δ' is the result of replacing the first verb in δ by its (appropriate) present perfect form, and all \bar{t} 's in the preceding derivation are replaced by t 's.

As opposed to S17', S4' will retain \bar{t} 's in the categories since this rule may participate in the formation of performative sentences (provided that the arguments of F_4 are appropriately marked expressions, e.g. the IV-phrase contains a performative marked verb, and also provided that the value of F_4 will not get embedded by the subsequent application of S7', for instance).

This kind of proposal seems to give an adequate account

for the fact that (i) no special syntactic rule is needed for performative sentences - it is in fact in this sense that they belong to the normal paradigm, but (ii) not all syntactic rules may participate in the formation of performative sentences. The retrospective \bar{t} -reduction does not seem to cause troubles since it actually does not change the derivation, only indicates that a possibility that has previously been present is cancelled. Note also that this proposal relies on a principle similar to the one Montague used in PTQ, namely, that in case a certain phenomenon has both "simple" and "complicated" variants (as is the case with extensional and intensional readings, or with proper nouns and quantifiers as term phrases) then the simpler one should be treated as a special case of the more complicated one. In the above analysis statement structures are treated as special cases of performative structures.

In sum, we have so far concluded that 'I congratulate you' is in category \bar{t} , whereas 'I have congratulated you' is in category t , everything else (save for tense) being the same in their derivation.

Let us now turn to the semantic aspects of this proposal. The necessary extensions of intensional logic are as follows:

- Type, or the set of types, is the smallest set such that
- (1) $e, t, s \in \text{Type}$
 - (2) If $\alpha, \beta \in \text{Type}$, then $\langle \alpha, \beta \rangle \in \text{Type}$
 - (3) $\langle s, s \rangle \langle s, t \rangle \in \text{Type}$

Here $\langle s, s \rangle$ is the type of functions from indices to indices (as in Gallin (1975)), and $\langle s, s \rangle \langle s, t \rangle$ is but a subtype of those functions, as to be defined below. Let w be a variable of type s . To the definition of meaningful expressions of IL we add the clause

$$\text{If } \alpha \in \text{ME}_{\langle s, t \rangle} \text{ then } \lambda w. w[\alpha] \in \text{ME}_{\langle s, s \rangle \langle s, t \rangle}.$$

and for the extension of such an expression with respect to $\langle u, i, j, g \rangle$:

If $\alpha \in ME_{\langle s, t \rangle}$, then $\lambda w. w[\alpha]$ $\langle u, i, j, g \rangle$ is that function h that assigns to $\langle i, j \rangle$ another $\langle i, j' \rangle$ such that $j' \gg j$ and $\langle i, j' \rangle$ is identical to $\langle i, j \rangle$ with the (possible) difference that $[\vee \alpha] \langle u, i, j', g \rangle = 1$.

That is, the expression $\lambda w. w[\alpha]$ denotes a change function whose argument and value are identical except that a certain statement is true at its value.¹⁶

For translating English categories into types of IL we extend f so that

- (1) $f(e) = e$
- (2) $f(t) = t$
- (3) $f(s) = s$
- (4) $f(A/B) = f(A//B) = \langle \langle s, f(B) \rangle, f(A) \rangle$ whenever $A, B \in \text{Cat}$
- (5) $f\left(\frac{s}{s}\right) = \langle s, s \rangle \mid \langle s, t \rangle$

(Clause (5) is rather awkward as it translates both s/s and t to the opposite of what could be expected on the basis of (1)-(4); nevertheless, at present I see no better way to ensure both that performatives themselves get extensional readings and that the statements specifying the nature of the change may not be interchanged on the basis of identical truth values.)

Finally, let us exemplify the translation rules corresponding to syntactic rules producing performative sentences with T4':

T4': If $\alpha \in P_{\overline{t}/(t/e)}$ and $\delta \in P_{\overline{t}/e}$ and α, δ translate into α', δ' respectively, then $F_4(\alpha, \delta)$ translates as $\lambda w. w[\wedge q]$, where q is the translation of $F_{14}(\alpha, \delta)$.

In other words, a sentence like 'I congratulate you' is trans-

lated into an IL-expression denoting a change function such that its argument and value are identical indices, with the possible difference that at its value it is true that 'I have congratulated you'. This will indeed obtain in case the sentence 'I congratulate you' has been (happily) uttered at a previous moment j .

¹⁶ I avoided the explicit treatment of indexical expressions like 'I' and 'you', since it is not specific for performatives.