THE ROADS OF FORMAL PRAGMATICS

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The term pragmatics can be interpreted in a lot of ways. This term has different meanings according to the different approaches of linguistics, philosophy and logic. Besides it has various meanings in these disciplines too.

I will not try to give any definition of pragmatics. Instead of this I would like to speak about results of two frameworks which make it possible to construct an appropriate formal pragmatics. Namely I would like to compare the results of the most elaborated formally correct system of pragmatics, built up by R. Montague, and the most promising theory providing a framework for pragmatics, i.e. game theoretical semantics.

By comparing the main results of the two theories my final conclusion is as follows: they are to be considered as complementary rather than rival ones.

The real importance of the game theoretical approach begins precisely there where the possibilities of a Montague-type semantics come to an end. I would like to argue for my thesis by listing the main advantages and the open problems of both theories.

Supposing an acquaintance with Montague-type intensional logic and indexical pragmatics [see: 11] I would like to stress that Montaguan pragmatic theory has all the advantages and disadvantages of any approach characterizable by the three key-terms: set theoretical semantics, recursive truth conditions and possible world semantics. The main advantages of a Montague-type pragmatics:

(1) From a logical point of view it is the most elaborated and exactest theory. Following the way of Frege - Tarski - Carnap - Kripke, Montague created the *first correct pattern of a system of pragmatics, by marking a difference between sense-determining and meaning-determining components*. By the distinction of sense and meaning Montague intends to state the following: one will know the sense of an expression if one knows what it denotes in all possible worlds. The meaning of an expression will be known if we can give the

denotation not only in all possible worlds but in every context of use too.

(2) The interdefinability of extension and intension is the outstanding achievement of Montague's method. In brief: let *A* be an expression in any grammatical category of a given language with a given intensional interpretation, the intension function assignes an extension to *A* at every index given by the interpretation. And vice versa: if the extension of the expression is determined at all possible indices thereby its intension is also given.

(3) Over and above its mathematical elegance, its results are extremely significant from the point of view of philosophy too. This is because the introduction of intensions to semantic theory does not require any revision of the extensional theory of semantics. (As it was pointed out by R. Thomason in 19.)

(4) Extending the scope of logic to the pragmatic aspects of the use of language, Montague realized the first variant of the formal semiotic programme. As it is known, the main motivation for Montague to build a theory of pragmatics was the fact that there are natural language expressions the denotations of which depend on the use of the sign and are changing from use to use.

The representation of context dependence by the technique of indices (by points of reference) is obviously connected with a model-theoretical conception of semantics.

Now let us see the major disadvantages: Though the formal analysis of the use of language with respect to the relevant contextual information is restricted to the investigation of the so called indexicals (i.e. such words as "I", "now", "here" etc.). The pragmatic language of Montague and its pragmatic interpretation covers only the phenomena of indexicals. There are several questions to be raised:

(i) Is it correct to call the formal analysis of index-words pragmatics?

(ii) Is the behaviour of the index words fully described in Montague's pragmatics?

(iii) Is the formal theory of pragmatics which investigates the logical laws of the use of language exhausted by the formal theory of index-words?

Answer to question (i): To state that the analysis of index-words belongs to pragmatics is correct for at least two reasons.

First: these words are the simplest representations of context dependence. For this reason we can qualify their analysis as an indispensable prolegomenon. [see: 2] Second: in such a theory it is easy to prove the validity of statements like "I exist". (The proof of validity is based on the utterance of the sentence.)

Answer to question (ii): On the other hand the formal handling of context dependence needs a finite list of indexical features to be taken into account. But one cannot be sure to find all of them. (Natural language abounds in index-words, e.g. "10 years ago", "to the left", "by the evening" etc.) It is probably hopeless to list and include them all in a formal theory of indexicals [see: 2]. How long series of the relevant points of reference can be allowed without risking overcomplicatedness in our logical theory?

Further, by investigating the problems of intensional phenomena of index-expressions one finds examples which need a more sophisticated treatment than that offered by Montague's indexical approach. The point is that it is the empirical linguistic research that must find out which of the conceivable index-words are actually realized. And to this we have to have some ideas of the nature or meaning of the index-words. For instance "next day" and "tomorrow" cannot be freely replaced by each other in every situation. [see: 2 and 7]

Answer to question (iii): Not only from a linguistic (or philosophical) but from a logical point of view too pragmatics cannot be restricted to the investigation of indexicals.

The point is that there are such features of the use of language which cannot be characterized by the Montague-technique, e.g. by the approach of the recursive truth conditions. The idea of the recursive definition of meaning is very problematic for such phenomena in which the semantical value of an expression cannot be determined according to the Fregean principle. Excellent examples are the anaphoric tense operators like "then" or the "*wh*-constructions", further the Ross paradox, the problem of logical omniscience and a lot of other things.

Generally speaking there are such features of language-use which are expressible by logical means, but not by the Tarski-Montague type recursive technique.

The answer to the third question is the following: I think the investigation of the laws of the use of language must be continued in

other directions too. I mean first of all the Peirce - Wittgenstein - Hintikka line of approach – namely the so called game theoretical one can serve as a basis for a new type of logical pragmatics.

Some remarks are in order to illuminate the intuitive motivations of this theory.

Game theory investigates situations in which the deeds of persons influence, but do not determine completely the outcome of an activity. The way how the deeds influence the outcome is expressed in the rules of the game.

Concerning the philosophical background of the theory it is very important to mention Wittgenstein's notion of Sprachspiel. The function of the notion "language-game" is to emphasize that language is spoken by a human community and is part of an action, a style of living. The new conception of the relationship between reality and language-game is essentially to show the insufficiency of the picture theory of the Tractatus, and everything connected with it (the given facts, given world, given meaning etc.) Since the Tractatus and model-theoretical semantics are related, problems which are not taken into account by the Tractatus are ruled out from a logical semantics as well. Neither this nor that asks about the representative relation between language and reality. This relation is created by rule governed human activity, which is called by Wittgenstein language-game (see: Hintikka: Language-games in 1). Wittgenstein did not work out a theoretical system for his conception of language-game. This is done by Hintikka and his associates. Their theoretical framework includes every result of the first order logical semantics. This is very important from the standpoint of its formal correctness.

In game theoretical semantics a complex sentence is interpreted by means of a two person game. The rules of the game are based on the idea that the proponent (Myself in Hintikka's terminology) tries to verify the sentence against the counter example(s) which his opponent (Nature) might produce. The truth of a complex sentence may be defined as follows:

(G.T) A is true iff the proponent has a winning strategy in the game correlated to A.

A player has a winning strategy in a game G if and only if he can choose his moves in the course of the game in such a way that no matter what his opponent does he ends up winning the game. Thus the

truth of a sentence uttered by the speaker means that it is possible to defend it against Nature's attempt to falsify it. The game rules for "or" and for existential quantification prescribe that the proponent (speaker) choose one of the disjuncts or an individual respectively (relative to the given world w). The rules for conjunct and universal quantifier are the same except that in this case Nature's choice is the beginning step. Modalities can be interpreted by rules analogous to rules of conjunction and disjunction except that in this case the players choose among possible worlds.

Thus the game rules serve the same purpose in game theoretical semantics as the different recursive clauses do in a Tarski-Montague type truth definition.

Supposing familiarity with the results of game theoretical semantics let us consider the major novelties and advantages of game theoretical semantics over the traditional recursive semantics.

Usually the following two advantages are mentioned by Hintikka's circle:

(a) the notion of information set
(b) the notion of step-wise evaluation.

In the light of modern researches (first of all researches in Game Theoretic Semantics) we can see the limited validity of the Tarski postulate (the recursive characterization of the notion of truth) and at the same time that of the Frege principle. Results as e.g. branching quantifiers, backwardslooking operators, the problem of infinitely deep languages are very important because they show that compositionality really fails in both kinds of languages (i.e. formal and natural ones). Its failure for certain perfectly explicit formal languages is all the more interesting, as it shows that whatever difficulties there are in trying to maintain the Frege Principle are not due to irregularities or imperfections of natural languages.

This failure of compositionality shows that semantic theories relying on Tarski-type truth characterizations cannot be fully adequate. The argument for non-recursivity does not mean that we abandon truth condition semantics, rather it seems to corroborate the conclusion that it is high time we formulated a new paradigm, which does not seek truth conditions on the basis of compositionality, but from an

opposite direction, from outside in (see Hintikka's argumentation in: Theories of Truth and Learnable Languages [6/a]).

In a Game Theoretic approach the semantical properties of sentences are not spelled out recursively on the length of the subformulas. Stepwise evaluation proceeds from outside in and refers to the earlier stages at every stage of the evaluation. The advantages of this kind of approach come out best when we consider various kinds of context dependencies, e.g. anaphoric phenomena. In such cases a stepwise evaluation of a sentence may lead us to consider a subsentence whose semantic properties depend on the evaluation so far.

The key point is that game rules are context dependent: they define how a game which has reached a certain stage can be continued. That is, the theory itself is pragmatically motivated. This is not merely a technical advantage but it has theoretical importance from a logical point of view. First of all we need not restrict the relevant contextual information to the investigation of the so called indexicals. I think the treatment of quantification in game theoretical semantics essentially outlines a logical pragmatics of a new type. The game rule of quantification is what Hintikka calls the language game of seeking and finding. The validity of this is evident in the case of a quantified sentence. If a player wants to win the game he must not choose an individual at random. The game of seeking and finding needs a careful work. Moreover the diversity of quantificational activities is much better matched by game rules than in the usual first order language, containing only the universal and existential quantifiers. Let us take for example the problem of the so called non-standard quantifiers. Are there differences between the expressions "some", "several" or "many"? Yes there are. Can we construct rules for them? Yes we can.

Without any details I would like to stress that the comparison between the game rule of the sentence prefix "many" and that of the sentence prefix "several" shows how game rules serve to bring out differences in meaning. (With the prefix "several" only the absolute number of individuals – agreed upon by the players – counts, whereas with the prefix "many" it is the relative frequency of certain individuals that matters.)

The game theoretical semantics really gives an approximately good solution for the *use* of the quantifiers in natural languages, especially

in English. Moreover we could mention the analysis of the "any" problem, the differentiation of the use of the pronouns in a singular and in a general sense. In these cases we have to appreciate the fact that the game rules describing the different uses of ambiguous quantifiers disambiguate them, and all this is done in a very natural way. This feature is connected with the basic idea of game theoretical semantics i.e. to understand a sentence S means to know what happens in the correlated game.

It is worth to mention Hintikka's solution of Ross' paradox, according to which if somebody is obliged to do p then he is obliged to do p or q:

$$O(p) \Rightarrow O(p \vee q)$$

Without going into details, the main line of the solution is as follows: First the game rule of obligation has to be given: (G. must) When a game has reached a sentence of the form O(p) in a world w then Nature (the opponent) chooses a deontic alternative w' to w and the game is continued with respect to w' and p (w' chosen by Nature is the same as the actual people's choosing their acts, see: [1]). According to this rule the game connected with a disjunctive obligation or imperative begins in a given world w by Nature's choice of a deontic alternative w' to w and is continued with respect to w' and the sentence within the scope of O.

Now according to the "or-rule" Myself (the proponent) or in the case of imperative discourse the "Imperator" chooses one of the disjuncts. If that disjunct turns out to be true (or satisfied by the real agent) the speaker wins the game and so the original deontic sentence is defended.

What is confused when the paradox arises according to Hintikka's account is not just the choices of two different persons. What has really been replaced is a move by one of the players of a semantical game with an action of an agent typically engaged in actually changing the world. The deep contrast is thus not between persons but between two types of activity, two different language games (see: Hintikka in 1).

Hintikka's explanation is surprisingly simple. It is achieved just by the fine differentiation of these two types of activity, and this is done by applying the appropriate semantical game rules. His approach is a

kind of two level methodology. By applying the two level method [see: 6] that paradox does not even arise. What is especially interesting here is that the pragmatic explanation is not an *ad hoc* one but is closely connected with the basic theory.

However Hilpinen's criticism on the solution of the Ross paradox is correct [see: 3/a]. According to him Hintikka's game rules reflect the descriptive interpretation of deontic sentences. Ross' paradox was originally formulated as a paradox of imperatives. Hilpinen suggests a revision so as to make the game rules applicable to imperative discourse. The point is that in an imperative game one has to make clear who is responsible for the satisfaction of the imperatives. (At the beginning of an imperative game the hearer chooses one of the disjuncts from the sentence of the form $A \vee B$).

I think Hilpinen's version of game rules is a very important refinement on the game theoretical approach. It is natural to give the duty of the speaker to the hearer (to the very agent). This correction is all right. But it does not mean at all a basic revision of the pragmatically motivated game theoretical approach.

Unfortunately game theoretical semantics has not been presented in a fully explicit formulation. That makes comparison with other systems difficult. But enough work has been done and brilliant results have been achieved so that we can see not only the perspectives but the significance of game theoretical semantics in some aspects. (Even a cursory glance at the bibliographical part of [6/a] will convince anybody about the vast amounts of literature of game theoretical semantics.)

Let me complete my opinion on the connexion of the model theoretical and game theoretical approach with respect to pragmatics by the following argumentation of Hintikka [see: 4].

Let us speak about *A*-rules as semantic rules in the usual classical sense and *G*-rules as rules in the sense of game theoretical semantics. (*A*-rules might also be called game-rules.) These rules represent different types of activities. Hintikka calls the *A*-rules as rules of "indoor games" and the *G*-rules as rules of "outdoor games".

The question is this: How do the *A*-games help us in playing *G*-games?

The *A*-games of formal logic (the games of proving and disproving formulae) help us in the *G*-games so that they show what our limits of

freedom in this game are. But these *A*-rules do not reflect the activities which connect the sentences of an interpreted language with the reality which this language conveys information about. This is the very reason why we must apply the new type of rules, i.e. the game theoretical rules in building up a suitable formal pragmatics.

Hintikka's argumentation supports my view on the complementarity of the two theories. Of course critical remarks and analysis are unavoidable as opposed to the Montague semantics but it cannot be accepted (as Saarinen thinks) that the game theoretical approach undermines the recursive truth definition and the pragmatics built on it. The semantical game theory does not invalidate the conceptions built on classical logical principles but raises the need for new perspectives and a new approach. We can start to analyse expressions by formally describing a much less well behaved world only after the analysis of the expressions behaving classically. That is (as against Saarinen or R.M. Martin) it was not a vaste of time to study Montague. He made unavoidable steps on the way of enriching the formal instruments of logic and especially in the development of formal pragmatics.

Adding to this the complementarity of the two theories is obvious if we acknowledge that one of them deals mainly with "deep structure" and the other mainly with "surface structure". And the point is that a formal pragmatic theory must neglect neither the one nor the other. To start with one needs a Montague-type approach. The theoretical foundations and the reliability of the game theoretical semantics are founded by this.

On the other hand if we analyse the philosophical background of the two approaches we will see that the two conceptions account for the two main functions of language and explain meaning only from this. One of the trends of philosophy of language takes into account the descriptive, denoting function of language. The other trend takes into account the communicative function of language explaining meaning only from this.

As a matter of fact my opinion when I stress the need for a synthesis of different approaches for an appropriate formal pragmatics is in accordance with a substantial tendency in present-day philosophy of language, the tendency which agree with a comprehensive approach towards natural language. I can mention first of all speech act theory.

It is well known that according to Searle the general form of an illocutionary act is F(p). Loosely speaking the meaning of an utterance can be described on two levels: on the level of p the meaning can be described in terms of logical semantics, and on the level of F the meaning is to be identified with the illocutionary force.

Now we have to give up both the separate strategy of meaning-monism and that of use-monism. In this respect I think we have to revise the Wittgensteinian slogan: Don't ask for the meaning, ask for the use. I agree with those philosophers of language who hold that the meaning of a complex expression is determined not only by the meaning of its constituents but also by their specific use. In short in verbal communication we not only make use of meanings but the use itself constitutes sense.

Furthermore besides the mentioned comprehensive tendencies and their realizations it is also necessary to revise the traditional ideas on the status of syntax, semantics and pragmatics. These traditional ideas arise from two different conceptions. Partly from the received view on the priority of syntax + semantics and partly from the interest in artificial languages, where the system is defined in terms of syntactical and semantical rules. (As we can see in Carnap's substantial works) This phenomenon is named by A. Kasher "the disease of pragmaticitis separatosis".

But if we want to apply our formal systems to an explanation of the phenomena of natural language we have to incorporate the *rules of use as a part of the definition of a language system*. It means we have better to say that syntax, semantics and pragmatics are mutually inter-dependent on each other, and that none of these disciplines have absolute priority over the others with regard to the understanding of the mentioned phenomena. I think this new conception is necessary for elaborating a pragmatic theory.

A final remark: I wanted to sketch how I imagine an appropriate pragmatic theory which provides exacter and exacter tools for the researchers who are interested in the problems of the use of language in a wide sense. To elaborate it in a correct way is the task of further investigations. I am convinced that the two theories compared in my paper (naturally among others) will help to realize this programme.

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