

Abstract

Could we enrich speech-act theory to deal with discourse? Wittgenstein and Searle pointed out difficulties. Most conversations lack a conversational purpose, their background is indefinitely open, they contain irrelevant and infelicitous utterances, etc. In my view, the primary aim of discourse pragmatics is to analyze the structure and dynamics of language-games whose type is provided with an internal conversational goal. Such games are indispensable to any kind of discourse. Logic can analyze their felicity-conditions because they are conducted according to systems of constitutive rules. Speakers often speak non-literally or non-seriously. The units of conversation are attempted illocutions whether literal, serious or not. I will show how to construct speaker-meaning from sentence-meaning, conversational background and maxims. Like Montague, I believe that we need the resources of formalisms (*proof*-, *model*- and *game-theories*) and of logic in pragmatics. I will explain how to further develop *intensional* and *illocutionary* logics, the logic of *attitudes* and of *action* in order to characterize our ability to converse. I will compare my approach to others (Austin, Belnap, Grice, Montague, Searle, Sperber and Wilson, Kamp, Wittgenstein) as regards hypotheses, methodology and issues.

1. Introduction

In sciences that deal with language, thought and action, one now recognizes the essential role in communication of speech-acts such as acts of utterance, reference and predication, illocutionary and perlocutionary acts, and of attitudes such as speakers' beliefs, desires and intentions. One also understands the crucial importance of language-games that interlocutors collectively intend to conduct, of their forms of life and conversational background. According to speech-act theory the primary units of meaning and communication in the use and comprehension of language are not isolated true or false propositions but rather *illocutionary acts* which have felicity-conditions (Austin 1962). *Elementary illocutionary acts* have a *force* (Frege 1977) and a *propositional content*. Interlocutors always intend to perform and communicate illocutions. Until now logic, philosophy and linguistics have mainly considered the speakers' ability to use and understand single sentences, without taking much into consideration their ability to conduct discourse. Similarly, speech-act theory has tended to study individual illocutions such as

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assertions, promises and requests that speakers attempt to perform by using sentences at single moments of utterance. However, speakers most often converse with other agents. Above all, the use of language is a *social form of linguistic behaviour*.

Can we extend *speech-act theory* to deal with discourse? Wittgenstein and Searle have expressed skepticism. Interlocutors often have an extra-linguistic goal; they are engaged in social activities and their background is indefinitely open. They make infelicitous and totally irrelevant utterances without *eo ipso* interrupting the dialogue. Their purposes often change arbitrarily. So the requirement of relevance imposes relatively few constraints on the structure of most conversations. However the ability to converse is part of linguistic competence. Moreover protagonists always perform in any discourse (whether dialogue or monologue) *master illocutionary acts* with the intention of achieving proper linguistic goals corresponding to a possible direction of fit between words and things. They manifest attitudes (expressive goal), describe the world (descriptive goal), deliberate on what to do (deliberative goal) or change things by way of declarations (declaratory goal). Such linguistic goals are conversational. Verbal exchanges such as salutations, debates, interviews, consultations, negotiations, compromises, agreements, collective decisions and ceremonies of inauguration, wedding and baptism are *joint illocutionary acts of higher-level* irreducible to sequences of individual instantaneous illocutions. Several agents obeying constitutive rules perform them in turn and they last over an interval of time. From a logical point of view, they have a conversational *type and theme* and their conduct requires cooperation. The *logic of discourse*, as I conceive of it, cannot study all possible language-games but only those with a proper linguistic goal. There are a lot of such language-games and they are indispensable to discourses with extra-linguistic goals. Interlocutors must come to agree on the kind of conversation that they want to pursue. Whenever they communicate in order to do difficult things, they have to describe their objective and to deliberate on how to proceed to achieve it. The aim of this paper is to present my approach towards discourse pragmatics and to compare it to others as regards methodology, hypotheses and issues. I will take into account previous

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work in analytic philosophy (on action, attitudes and speech-acts), in social philosophy (on cooperation), in philosophical logic (on sense, denotation, illocutions, attitudes and action), in formal semantics (logical ideography, universal grammar, discourse representation), in conversation analysis (on maxims and background), in linguistics (on illocutionary markers and action verbs) and in psychology (on mutual understanding).

2. Issues addressed and theoretical objectives

Like Montague, I believe that pragmatics should use the resources of formalisms and logic in order to establish a rigorous *theory of meaning and use*. Natural languages can be learned by human agents whose cognitive abilities are creative but limited. Formalisms enable us to better construct linguistic competence and the mechanisms of understanding. However one must revise basic hypotheses of standard logics of *propositions, attitudes* and *action* in order to explicate felicity-conditions of illocutions. Propositions with the same truth-conditions are not the contents of the same attitudes and illocutions, just as they are not the senses of synonymous sentences. One can assert and believe that Paris is a city without asserting and believing that it is a city and not an erythrocyte. Speech-act theory requires a finer criterion of propositional identity. It also requires explicating the intentionality and minimal rationality of interlocutors as well as the generation of speech-acts in the logic of action. We need illocutionary logic in the ideography of formal semantics in order to exhibit canonical forms of illocutions expressed by all syntactic types of sentences.

Of course the real units of conversation are intended rather than expressed illocutions. Often speaker-meaning is different from sentence-meaning. In the cases of irony, indirection and metaphor, speakers do not speak literally, just as they do not speak seriously when they act in a theatre play. In order to contribute to *discourse pragmatics*, speech-act theory should explicate full *speaker-meaning* (all attempted illocutions whether literal, serious or not) and the *structure and dynamics of dialogues* that speakers are able to pursue by virtue of competence. For that purpose, we need a theory of conversational maxims (Grice 1975) and an analysis *of* relevant facts of conversational background. Unfortunately Grice's

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maxims are vague and only apply to assertive utterances in informative discourse. We must generalize his approach and better explicate relevance in discourse than did Sperber and Wilson who neglect conversational goals. Moreover we must analyze what speakers do when they are not serious but pretend to perform illocutions in theatre or fiction. In order to account for discourse dynamics, one should exploit resources of game-theory and take advantage of new developments in dynamic, dialogical, paraconsistent and non-monotone logics, discourse representation and decision theories.

Since Montague many logicians and linguists have exploited formalisms such as proof- and model-theory originally conceived for artificial languages in order to develop semantics of natural languages. Some have indirectly interpreted ordinary sentences after translating them into an ideographical disambiguous object-language. Formalisms enable us to exhibit the deep structure common to all natural languages and to define speaker-meaning recursively. However primary units of meaning and communication *are* not isolated propositions, as Montague claims, but rather elementary illocutions such as assertions, questions and thanks, having a *force* in addition to a *propositional content*. Speakers making meaningful utterances *attempt* to perform illocutionary acts. So there is a *force-marker* in elementary sentences. Sentential type is the basic force-marker. Whenever they are used literally, *declarative* sentences serve to make *assertions*, *interrogative* sentences to ask *questions*, *imperative* sentences to give *directives* and *optative* sentences to *express wish*. Thus sentences with synonymous clauses like “You will help me”, “Will you help me?”, “Please, help me!” and “If only you would help me” express in the same contexts illocutions with the same content but different forces. Similarly, sentences with the same force-marker like “Come!” and “Eat!” express illocutions with the same force but different contents. Grammarians have long acknowledged illocutionary aspects of sentence-meaning in their classification of sentential types. Thanks to speech-act theory one can better analyze force-markers. Imperative sentences like “Let’s go!” whose verb is in the second person plural express an offer to implement a common action. Explicit performative sentences like “I hereby promise

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to come” have the primary force of a *declaration*. They serve to declare rather than to simply assert that the speaker performs the illocution named by their performative verb.

Until now, traditional logic has mainly studied truth-conditions and valid theoretical inferences. Thus formal semantics has mainly analyzed expressions like names, predicates and connectives whose meaning contributes to the determination of truth-conditions and it has tended to construct linguistic competence as being the speaker’s ability to understand propositional contents. According to Davidson and Montague, the single most important objective of semantics is to formulate the *theory of truth*. For that reason, most applications of formal semantics to actual natural languages have been restricted to the interpretation of declarative sentences. However language serves to change the world as much as to describe it. There are five *illocutionary points* that speakers achieve on propositional contents. Speakers express propositions in order to represent how things are (*assertive point*), to commit themselves to doing something (*commissive point*), to make an attempt to get hearers to act (*directive point*), to do things with words (*declaratory point*) and to express attitudes (*expressive point*). They make practical as well as theoretical inferences. Conclusions of theoretical inferences are assertive illocutions that are true or false. Whoever asserts a conjunction is committed to the truth of each conjunct. Conclusions of practical inferences are commissive, directive or declaratory illocutions representing actions of the speaker or hearer. Whoever asks a question requests an answer from the hearer. Thanks to illocutionary logic, formal semantics becomes able to analyze force-markers whose meaning contributes to the determination of felicity-conditions and to interpret, without any *ad hoc* reduction to declaratives, imperative, interrogative, performative, exclamatory and subjunctive sentences expressing illocutions with non-assertive forces. In my view, *linguistic competence* is inseparable from *performance*. It is the speaker's ability to perform illocutions.

By nature illocutions are *intrinsically intentional actions*: their performance by a speaker requires a verbal *attempt*. They have *success-conditions*. In order to *succeed*, speakers must correctly express intended illocutionary acts by using appropriate words, and make their attempt in an adequate context. A

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baptism is not successful when the priest uses the wrong proper name or christens the wrong baby. Speakers relate propositional contents to the world with the intention of establishing a *correspondence* between words and things from a certain direction of fit. Whoever makes an assertion intends to represent how things are in the world. Whoever gives an order intends to have the hearer do represented things. Whoever makes a declaration intends to do represented things with words. Assertive utterances have the *words-to-things direction of fit*, commissive and directive utterances the *things-to-words direction*, and declarations the *double direction of fit*. Such illocutions have *satisfaction-conditions*. In order for an elementary illocution to be *satisfied*, it is not enough that its propositional content is true and corresponds to an existing fact in the world. The correspondence between words and things must be established from the proper direction of fit. Whoever obeys a command must do what is commanded *because of* that command. The notion of *satisfaction* is a generalization of that of truth needed to cover all forces. Thus an *assertion* is *satisfied* when it is *true*; a *promise* is satisfied when it is *kept*; a *request* when it is *granted* and a *declaration* when it is *true* because of its performance. Satisfaction involves *intentional causation* when forces have the things-to-words direction of fit.

Some successful illocutions are unsatisfied. Assertions can be false, promises can be violated and requests can be refused. However *success, satisfaction and truth are logically related*. The satisfaction of elementary illocutions requires the truth of their propositional content. Some illocutions have stronger conditions of success or of satisfaction than others. Whoever supplicates makes a request. Whenever a promise is kept, the assertion of its propositional content is true. Moreover the successful performance of certain illocutions requires the satisfaction of others. Successful declarations are satisfied. Conversely, satisfaction can require successful performance. Any kept promise has been made. Whoever understands felicity-conditions makes practical and theoretical valid inferences. He understands that certain illocutions cannot be performed and satisfied unless others are. So any competent speaker infers from a premise of the form “Any man is mortal and Socrates is a man” the conclusion “Socrates is mortal” (theoretical inference). Similarly, he infers from a premise of the form “You should help others” the

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conclusion “Help others!” As one might expect, conclusions of theoretical inferences have the words-to-things direction of fit, while conclusions of practical inferences have the things-to-words direction of fit.

We need a *recursive unified theory of success, satisfaction and truth* that accounts for all this. In my approach, the semantic theory of truth advocated by Montague and Davidson for natural language is part of a more general theory of satisfaction for illocutions with an arbitrary force. Earlier logics of speech-acts like Rescher’s logic of commands, Belnap’s logic of question and attempts to extend intensional logic to the interpretation of sentences in discourse (Kamp) wrongly suppose that success- and satisfaction-conditions of illocutions are reducible to their truth-conditions. They ignore real felicity-conditions of speech-acts. Most approaches reduce, for example, a *question* to a set of possible *answers* to that question and then reduce these answers to their content.

3. Progress and methodology

In *Foundations of Illocutionary Logic* (Searle and Vanderveken 1985) we have decomposed each force into several components, namely: its illocutionary point(s), its mode of achievement of point, its propositional content, its preparatory and its sincerity conditions and its degree of strength. We also recursively defined the set of all possible forces and success-conditions of illocutions that speakers perform at a given moment. The *primitive forces* are the five simplest forces with an illocutionary point: the force of *assertion* that corresponds to the performative verb “assert” and the declarative sentential type; the force of a *commitment to a future action* named by the performative “commit”; the force of a *linguistic attempt to get the hearer to act* expressed by the imperative sentential type; the force of *declaration* named by the performative verb “declare” and expressed in performative utterances, and the force of *expression* of an attitude realized in the exclamatory sentential type. Primitive forces are universal. Other forces are obtained by adding to primitive forces new modes of achievement of illocutionary point, new propositional, preparatory or sincerity conditions, or by changing the degree of strength. Many complex forces are significant for particular linguistic communities. Felicity-conditions of

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elementary illocutions are determined by their force and content. An illocution of the form F(P) where F stands for a force and P for a proposition is *successfully performed* in a given context of utterance when, in that context, firstly the speaker succeeds in achieving the point of its force on its content with the required mode of achievement, secondly the proposition *P* satisfies the propositional content conditions of F, thirdly the speaker presupposes all propositions determined by preparatory conditions of its force and finally he also expresses with the required degree of strength all attitudes with the propositional content P determined by sincerity conditions. Thus a speaker makes a *promise* when he puts himself under an obligation to do something (mode of achievement of commissive point and propositional content condition), he presupposes that the action is good for the hearer (preparatory condition) and he expresses a strong intention to do it (degree of strength and sincerity condition).

Speakers can presuppose false propositions and express attitudes that they do not have. Certain promises are not beneficial to the hearer. Speakers also make promises that they do not intend to keep. Such promises are defective. An illocution is *non-defective* when it is successful and all its preparatory and sincerity conditions are fulfilled. Austin with his notion of *felicity-condition* did not distinguish between successful utterances that are defective and utterances that are not even successful. In illocutionary logic, an illocution is *felicitous* when it is successful, non-defective and satisfied. John Searle and I (1985) analyzed the meaning of English force-markers and performative verbs and pointed out the declaratory nature of performative utterances. Many force markers contain modifiers of sentential type expressing particular force components. So sentences with the same syntactic type can express illocutions with different forces. Imperative sentences like “Do it please!” and “Do it whether you like it or not!” respectively express a *request* and a *command*. Exclamatory sentences like “How glad I am!” and “How sad I am!” serve to express different attitudes. We did not analyze in detail satisfaction-conditions of illocutions.

For that purpose, I later formulated a *natural predicative logic of propositions* taking into account their double nature: propositions are both *senses of sentences* and *contents of actions and attitudes*.

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They have a structure of constituents: in expressing propositions, we refer to objects through concepts and attribute to them properties and relations. We do not directly have in mind individual objects like material bodies and persons. We rather have in mind concepts of individuals and we indirectly refer to them through these concepts. So our thoughts and actions are directed at individuals under a concept rather than pure individuals. We ignore the truth-value of many propositions for we ignore real denotations of their constituents in many circumstances. We can refer to Smith's wife without knowing who she is. However, we can in principle think of persons who could be that wife. So in any use and interpretation of language, there are many *possible denotation assignments* to attributes and concepts in addition to the standard *real denotation assignment* that associates with senses their real denotation in each circumstance. Possible denotation assignments respect *meaning-postulates*. Only sets of individuals under concepts are possible denotations of first-order properties in each circumstance. Wives are married women according to all assignments. In understanding propositions we simply know that their truth in a possible circumstance is compatible with some *possible denotation assignments* to their constituents and incompatible with others. In order to be *true* a proposition has of course to be true according to the real denotation assignment. Predicative logic explicates why propositions true in the same circumstances have a different cognitive value. Some have different structures of constituents. So are propositions that mothers are women and that erythrocytes are red. Their expression requires different *acts of predication*. Others are not true according to the same possible denotation assignments. So are propositions that whales are whales and that whales are mammals. We do not understand them as being true in the same conditions. Thus we can assert or believe necessary truths without asserting or believing others. Among all necessary truths, few are *pure tautologies* like the proposition that whales are whales which are true in all possible circumstances according to all possible denotation assignments.

There is no one-to-one correspondence between forces and English performative verbs or force-markers. Many markers and performative verbs are ambiguous. Moreover surface structures of force-

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markers and illocutionary verbs do not show the logical form of expressed forces. Sentential types such as the declarative, imperative and exclamatory types express the primitive assertive, directive and expressive forces, while the conditional and interrogative types express derived forces with additional components. As an example, a question is a directive with a special propositional content condition, namely that the hearer gives a correct answer to that question. Just as complex forces are obtained from simpler forces by adding components or by changing their degree of strength, complex force-markers are obtained by adding modifiers to sentential type. Imperative sentences whose verb is modified by *please* express requests. The adverb here expresses a polite mode of achievement: the speaker gives option of refusal to the hearer. And sentences like “Fortunately it is raining” and “Alas, it is raining” have a complex assertive force. The adverbs express here special preparatory and sincerity conditions. As Montague pointed out, by translating ordinary clauses into the object-language of intensional logic, formal semantics clarifies logical forms of propositions and achieves a better explication of truth-conditions. Similarly, by translating force-markers and performative verbs into the ideography of illocutionary logic, formal semantics clarifies logical forms of illocutions and achieves a better explication of felicity-conditions.

In *Meaning & Speech Acts* (Vanderveken 1990-1) I developed a general formal semantics of success, satisfaction and truth capable of interpreting, after translation into ideography, non-declarative sentences and of formalizing practical *inferences*. According to the *Routledge History of Philosophy* (Volume 10) “The notion of a *lingua philosophica* as an ideal language containing both an intensional and illocutionary logic is no longer merely a program but has already in many respects been realized” (Cocchiarella 1997: 72). I have enriched the formal ontology of semantics by adding success-values to truth-values and by adopting a predicative analysis of propositions. Clauses with indexical expressions express different propositions in different contexts. Like David Kaplan (1989) I have proceeded to a double semantic indexation. I also distinguished between linguistic meaning and meaning-in-context. The linguistic meaning of a sentence is, in my view, a function associating illocutionary acts with possible

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contexts. The *meaning-in-context* of a sentence is the illocution that it expresses in that very context (no matter whether the speaker uses it or not). Many sentences express different forces and propositional contents in different contexts just as many illocutions expressed in a context have different success- and satisfaction-values in different circumstances. Non-synonymous sentences can express the same illocution in different contexts.

So there is a general ramification of fundamental semantic notions of *analyticity*, *consistency* and *entailment*. Moore's paradoxical sentence (Wittgenstein 1958 II x) "It is going to rain and I do not believe that" is *analytically unsuccessful*: it cannot be used literally with success. Speakers cannot simultaneously perform an illocution and deny its sincerity conditions. But since they can lie, Moore's sentence is not analytically unsatisfied. It expresses a true assertion in a context where the speaker insincerely asserts that it is going to rain. Moreover Moore's paradoxical sentence is *illocutionarily consistent*: it expresses performable assertions. Someone else could assert that it is going to rain and that I do not believe it by uttering another sentence.

Just as there are four different relations of implication between success- and satisfaction-values, there are four different kinds of entailment between sentences. Certain sentences *illocutionarily* (or *truth-conditionally*) *entail* other sentences: they express in each context an illocution whose successful performance (or satisfaction) implies the successful performance (or satisfaction) of illocutions expressed by other sentences in that context. The performative sentence "I request your help" illocutionarily entails the imperative "Help me please!" and truth-conditionally entails the conditional "You could help me". Notions of *illocutionary* consistency, analyticity and entailment have previously been ignored by formal semantics. However, they apply to all kinds of sentences, and ramified semantic notions do not coincide in extension (See Vanderveken 2004). Thus performative sentences illocutionarily, but not truth-conditionally, entail corresponding non-performative sentences. Performative utterances have the primary force of a declaration and the secondary force named by their performative verb. Because declarations have the double direction of fit, whoever successfully declares that he performs an illocution derivatively

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performs that illocution. However this secondary illocution need not be satisfied. Performative sentences are the strongest kind of sentence because successful declarations are felicitous. Any illocution can be performed by declaration. Therefore performative sentences illocutionarily entail all other types of sentences but the converse is not true. By assigning as semantic values to sentences-in-contexts entire illocutions with felicity-conditions, semantics better analyzes sentence-meaning and valid inferences.

We must enrich *intensional logic* by dealing with action, time, modalities and attitudes to get a finer theory of felicity. Elementary illocutions are intrinsically intentional actions related to other actions and attitudes. As an example, propositional contents of commissive and directive utterances represent future actions of speakers and hearers, propositional contents of declarations represent present actions of speakers. A richer ideography would enable *formal semantics* to better show, via translation, canonical forms of illocutions expressed by all types of sentences (declarative or not). Clearly the force and content of utterances often depend on past utterances. Whoever replies to the question “How old are you?” by giving an age both makes an assertion and answers that question. We need a *discourse representation* (Kamp & Reyle 1993) in order to dynamically resolve ambiguities, ellipses, anaphors, presuppositions and force components. So semantics must consider in addition to the speaker, hearer(s), moment and place of each possible context of utterance its conversational background (forms of life, previous utterances, facts taken for granted and attitudes of interlocutors). We need a ramified conception of time (Prior 1967) and historic modalities (Thomason 1984) in order to account for indeterminism and the freedom of agents, since our actions and illocutions are not determined. Whenever we do or say something, we could have done or said something else, or nothing at all. In branching time each moment represents a complete possible state of the actual world at a given instant. According to indeterminism, several incompatible moments of time might follow a moment in the future of the world. That moment belongs to several histories with the same past and present but different historic continuations. Like Belnap (2001), I believe that *possible circumstances* are pairs of a moment of time and of a history. Future propositions can be true at a given moment in certain possible continuations of

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that moment and false at the same moment in other continuations. However non-final moments continue in one direction. As Occam pointed out, among all histories to which a moment belongs, there is one representing how the world would continue after that moment (see Prior 1967). For illocutions and attitudes of speakers (Vanderveken 2006) have a determined satisfaction-value in each given context. A promise made now is kept only if the agent does promised things in the real future continuation of the world. Other possible historic continuations do not matter.

Over the past decade I have added to predicative propositional logic *generalization*, logical and historic *modalities*, ramified *time* and *attitudes*. I have also developed the *logic of intentional action*. To that end, I have analyzed agents' *attempts* that are actions of a special kind: personal, intentional, free and successful. Agents personally and voluntarily make their own attempts. Whoever attempts to make an attempt makes it. Agents make attempts in order to reach an objective. Whoever attempts to make an attempt succeeds in making that attempt, but he can fail to reach his objective. In such a case his attempt is unsatisfied. In my logic of action (2005), intentional actions are primary as in philosophy. Unintentional actions are *generated* by intentional actions and they could always have been attempted. So mistakes and failures are not actions but events that happen to us. Moreover no action is inevitable.

My theory formulates laws governing attempts and explicates the nature of intentional actions and basic actions. It accounts for the minimal rationality of agents who are neither perfectly rational nor entirely irrational. Minimal rationality is related to the way in which agents represent felicity-conditions. We can believe and attempt to do impossible things. Therefore, our subjective possibilities are not always objective. However there are impossible contradictory things that we cannot believe nor intend to do.

My analysis of subjective possibilities is based on the following truth-definition: a proposition is *true according to an agent in a circumstance* when he has in mind all its constituents and that proposition is true in that circumstance according to all possible denotation assignments then *compatible with his beliefs*. We often express properties without knowing which entities possess them, while nonetheless knowing that only certain entities could have these properties. Some, but not all, possible denotation

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assignments are compatible with our beliefs. We ignore many essential properties of objects (properties that they really have in all possible circumstances). Possible denotation assignments compatible with our beliefs may violate essential properties. Thus we can be inconsistent and believe necessarily false propositions, for example that whales are fishes instead of mammals. However all possible denotation assignments do respect meaning-postulates. For that reason, we remain minimally rational. Since pure *tautologies* are always true according to all possible denotation assignments, we know *a priori* their necessary truth. We also always make valid inferences whose premises *strongly imply* their conclusion. A proposition *strongly implies* another when firstly it contains all its predications and secondly it *tautologically implies* it. For example, the elimination of disjunction generates strong implication. Therefore a desire to drink beer or wine contains a desire to drink. On the contrary, the introduction of disjunction does not generate such a strong implication, for its conclusion can have new senses. A desire to drink does not contain a desire to drink *or die*. My relation of *strong implication* requires much more than Lewis' *strict implication*: it is finite, paraconsistent, tautological, analytic and decidable.

It still remains to fully explicate intentional causation. In order that an agent *succeeds* in doing things, these things must be caused by his attempt. Sometimes the agent's attempt is *the cause* why intended things occur. However often there is causal overdetermination: agents do things for different reasons. The agent's attempt can simply be *a practical reason* why they occurred. I will analyze *practical reasons* in order to explicate *intentional causation* and satisfaction-conditions of illocutions with the things-to-words direction of fit. A hearer *obeys* a previous command when that command is a practical reason for his doing the things commanded.

Thanks to logics of action, time, attitudes and modalities illocutionary logic can better analyze propositional contents and forces. Its ideography can express past, present and future actions, abilities and attitudes of interlocutors. It can also characterize how illocutions relate to other speech-acts (acts of utterance, propositional acts, attempts at performing illocutions, and perlocutionary acts). Attempts at performing illocutions are new fundamental speech-acts in my taxonomy. They are constitutive of

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meaning. An utterance is *meaningful* whenever the speaker *attempts to perform* an illocution, no matter whether he succeeds or fails. Speakers attempt to publicly perform illocutions by emitting signs. It remains to explicate *how* and *under what conditions they succeed* and how successful illocutions *generate* others (invitations contain requests) and have perlocutionary effects (the hearer is sometimes influenced). At the basis of communication, agents attempt to move parts of their body and this *generates* (Goldman 1970) in various ways their speech-acts. *Generation* in communication is first physically causal (we orally utter sentences in producing sounds), next conventional (sentence-meaning serves to determine attempted illocutions). Generation is sometimes *simple* (speakers lie when they do not have expressed attitudes) or *by extension* (they sometimes indirectly perform non-literal illocutions). In order to explicate different kinds of speech-act generation, I will integrate illocutionary logic within the logic of action.

My methodology is related to formalization. Primitive theoretical notions obey clear and distinct meaning-postulates and lead to axioms. Other important notions are definable from them by elimination, formal explication or recursive induction. The laws of ideography should be valid according to model-theory and as far as possible provable and even decidable when agents know them by virtue of competence. I want axiomatic systems to be as complete as possible and adequate for a linguistic and computational treatment.

4. Sentence-meaning and speaker-meaning in conversation

Force, sense and denotation are three components of sentence- and speaker-meaning. Which illocutionary acts does a speaker *mean* to perform in a context of utterance? Speech-act theory adopts a principle of literality: it identifies speaker-meaning with sentence-meaning whenever possible. In that view, the speaker primarily attempts to perform the literal individual illocution expressed by the sentence that he uses when such an act is then *performable*. Natural languages offer rich linguistic means to express forces. Many scholars forget such means, either ignoring force in their semantics or multiplying unnecessarily literal forces. Following Grice, Searle and I do not multiply without reason sentence-meaning and semantic ambiguity. We appeal as much as possible to conversational maxims and

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background to explicate non-literal speaker-meaning. Thus declarative, interrogative and optative sentences like “I desire your help”, “If only you would help me” and “Could you help me?” that are often used to make *indirect* requests of help respectively express literal assertions, questions and wishes in general semantics. As Grice (1975) pointed out, most non-literal illocutions are cancellable. So are such recurrent indirect *requests* that are generalized conversational implicatures in Grice’s terminology. Most sentences can be used literally. Given new developments, general semantics contains a richer ideography with greater expressive powers. It can better translate sentences of natural language and assign to expressed illocutions a finer canonical form, clarifying their felicity-conditions. In non-literal utterances, speakers express the literal illocution, but they mean to perform other speech-acts. Otherwise, there would be too many senses and forces and no theory of linguistic meaning would be possible. Speakers using illocutionarily inconsistent sentences like “I am not myself today” know by virtue of competence that the literal illocution is self-defeating. They do not mean what they say. General semantics cannot explicate what they non-literally mean. But it allows for a systematic unified pragmatic construction of non-literal speaker-meaning from sentence-meaning.

By virtue of its logical form each attempted illocution commits the speaker to many other acts. A speech-act *strongly commits the speaker to* another when he could not then perform that act without performing the other. All predictions contain an assertion but not conversely. Assertions about the past are not predictions. Whoever means to perform an illocution *eo ipso* attempts to perform others with less success-conditions. But speakers are also committed to performing stronger illocutions. Whoever replies to an assertion by saying the contrary does more than assert the negation of its content. He then *contradicts* the previous speaker. General semantics can now explicate by simple generation such commitments to stronger illocutions. In contexts where certain propositional, preparatory or sincerity conditions are fulfilled, the successful literal illocution simply generates illocutions with a stronger force. In other contexts, there is no such illocutionary generation.

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As Searle and I pointed out, speakers are also weakly committed to illocutions that they do not overtly perform. Whoever agrees to help everybody is committed to agreeing to help you even if he did not make any reference to you. No one can literally say “I refuse to help you and I agree to help everybody”. Attempts can fail. But whoever attempts to perform an illocution is weakly committed to that illocution. Could we explicate to which speech-acts a speaker is weakly committed? There is a reflexive and symmetrical relation of *agentive compatibility* in the logic of action. Two moments are *compatible as regards an agent* when all actions that he performs at these two moments are simultaneously performable. A speaker is *weakly committed* to an illocution in a context when he could then perform that illocution at any moment that is compatible as regards that agent with the moment of utterance of that context. All the laws governing weak illocutionary commitment follow from this definition.

Speaker-meaning is often different from sentence-meaning in dialogue. Not only do interlocutors speak non-literally and non-seriously, but they also share forms of life and attempt by verbal interactions to achieve common goals and to perform together actions. As Wittgenstein (1958) pointed out, sentences are instruments that have roles and functions in language-games. He says: “Here the term “*language-game*” is meant to bring into prominence the fact that the *speaking* of language is part of an activity, of a form of life” (Wittgenstein 1958: 23). Our question is now: could we generalize speech-act theory to deal with conversation? First of all, many attempted illocutions are non-literal or non-serious, as I said before. Whoever expresses an illocution that is obviously unperformable or insatisfiable, given background-knowledge, means to perform another illocution. In Grice’s approach, in order to understand non-literal illocutions, the hearer must first determine the literal illocution and understand that the speaker cannot just mean to perform that speech-act if he respects conversational maxims, given mutually known facts of the background. In order to explicate speaker-meaning, *pragmatics* must add to semantics, conceived as theory of sentence-meaning, a theory of conversational maxims and an analysis of relevant facts of conversational background. In my framework hearers *infer* attempted non-literal illocutions from the *meaning-in-context* of uttered sentences, felicity-conditions of relevant illocutions and the hypothesis

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of respect of maxims given the background. I have generalized (in Vanderveken 1997) Grice's *conversational maxims of quality* (explicated as *Let your illocutionary act be felicitous!*) and of *quantity* (explicated as *Let it be as strong as required to achieve your purposes!*). An illocution is *stronger than* another when it has more felicity-conditions. Now maxims apply to all kinds of utterances. There is a *sub-maxim of quality for directives* which I formulate as follows: *Let your directive be a felicitous attempt to get the hearer to do something!* *Quantity sub-maxim: Let it be a directive as strong as needed!* Grice's maxims of quality and quantity are just particular cases for assertions. In order to respect maxims, speakers must well select forces and contents. Thus they obey the following principle: *Do not command but request the hearer when all depends on his good will. Only request him to do things that you wish and that he can do.* (Otherwise your directive will be defective.) *Do not request things that he will not do.* (Otherwise your directive will be unsatisfied.) *Command the hearer when you are in a position of authority and you really want him to act* (since a request would be too weak). *Command neither more nor less than what you want.* (Otherwise the content of your directive will not be as strong as needed.)

There are normal forms of inferences leading to attempted non-literal illocutions. Their premises contain finitely many background-facts whose existence is taken for granted by speakers. So a theoretical approach is in principle compatible with the openness of the background. Relevant facts are contents of attitudes and related to felicity-conditions. Hearers infer what speakers non-literally mean in exploiting and using conversational maxims (Grice 1975). In my view, a speaker *exploits a maxim* when he wants the hearer to recognize background-facts that would prevent him from respecting that maxim if his primary illocution were literal. Yet he clearly wants to cooperate and he can respect the maxim without violating another one. Therefore he then primarily means to perform another non-literal illocution, and he wants to communicate this. Irony and sarcasm are special cases of exploitation of the maxim of quality while indirection and hyperbole are exploitations of the maxim of quantity. In the case of *irony*, speaker-meaning is *in opposition with* sentence-meaning. It is part of background-knowledge that literal felicity-conditions are violated and that the speaker is attempting to perform non-literal illocutions with opposite

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conditions. The speaker's irony is directed to components of literal force and content determining violated felicity-conditions. By saying "I promise to attack you" a speaker ironically threatens the hearer when the future action is obviously bad for him. His irony then concerns the preparatory condition. By saying "I thank you for your help" a speaker ironically complains that the hearer did *not* help him when he is obviously not grateful but dissatisfied because he did not receive any help. The irony then relates to both the sincerity condition and the propositional content.

In the case of *indirect speech-acts*, speaker-meaning is *an extension* of sentence-meaning. The speaker relies on the fact that the literal illocution is too weak to achieve his linguistic purposes. Most often the speaker intends to achieve another point on the propositional content, and non-literal preparatory or sincerity conditions are obviously fulfilled. So one can indirectly promise help by saying "I will help you." When indirection is directed to propositional content, satisfaction-conditions of the literal speech-act are felicity-conditions of the indirect act. The speaker can assert that these conditions obtain. He can also ask the hearer whether they obtain. Given the background, the literal assertion is then obviously true and the literal question has or could have a positive answer. We often indirectly offer and even promise help by saying "I could help you", "Can I help you?" (preparatory conditions of the indirect act), "I intend to help you", (sincerity conditions), "I should help you", "Should I help you?" (mode of achievement). In such idiomatic uses, the propositional content of the indirect illocution is part of the literal content. An indirect speech-act is *categorical* whenever its non-literal felicity-conditions are part of background-knowledge. Sometimes the speaker's intentions depend on the hearer's answer. In such cases, the indirect speech-act is *conditional*. We just indirectly *offer* help when we ask whether the hearer is willing to receive help. Such offers are indirect promises that are conditional on the hearer's acceptance.

My analysis accounts for different kinds of indirection directed to force and content. It explicates indirect illocutions performed by way of making non-assertive utterances. Contrary to what Sperber and Wilson (1975) believe, I think that we effectively compute primary non-literal illocutions. They are minimally different from the literal speech-act. In general, ironical illocutions only differ by having

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components that are the opposite of literal components that are incompatible with the background. Indirect speech-acts are obtained by adding to literal components new components determining non-literal background felicity-conditions. So speakers respect exploited maxims in speaking ironically and indirectly. Ironic illocutions have felicity-conditions compatible with background-knowledge. In the case of indirection, the speaker means to perform the literal and the indirect speech-acts. These two illocutions are together as strong as needed to achieve all his purposes. Other figures of speech and maxims can be defined in my approach.

Searle (1982) pointed out some important difficulties for theories of discourse: interlocutors often have no conversational goal; they freely change kinds and topics of dialogue; they can make unsuccessful and totally irrelevant utterances without breaking the conversation; their intentionality is collective. Moreover the conversational background is indefinitely open and therefore not exhaustively describable. I have replied to Searle (Vanderveken 2001), saying the following. Of course, speakers are engaged in social forms of life and their purpose is often extra-linguistic. They communicate in order to coordinate non-verbal actions intelligently. I agree with Wittgenstein (1958) and Searle (1982) that there is no possible theory of *all possible language-games*. There are countless kinds of forms of life and objectives that we could share as human beings. So there are “countless kinds” of language-games that we could practise. As Wittgenstein puts it, “... this multiplicity is not something fixed, given once for all; but new types of language, new language-games, as we may say, come into existence, and others become obsolete and get forgotten” (Wittgenstein 1958: 23)

However in any dialogue speakers always mean to perform relevant illocutions in order to contribute to verbal exchanges such as presentations, justifications, debates, compromises and agreements which are higher-level speech-acts whose goal is conversational. The logic of discourse can analyze the logical structure and dynamics of such language-games for they are conducted according to systems of constitutive rules. My taxonomy postulates *four conversational goals* corresponding to the four different possible directions of fit between words and things. Discourses with the word-to-world

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direction of fit (like forecasts, interviews, accounts and interrogations) have a *descriptive goal*: they serve to describe how things are in the world. Discourses with the world-to-word direction of fit (negotiations, bets, arrangements and sermons) have a *deliberative goal*: to deliberate about what to do in the world. Discourses with the double direction of fit (inaugurations, permits, baptisms and classifications) have a *declaratory goal*: they serve to do things by declarations. Finally, discourses with no direction of fit (greetings, eulogies, welcomes and protestations) have an *expressive goal*: they just serve to express common attitudes. Competent speakers are all able to achieve conversational goal because they have intentionality. There is a one-to-one correspondence between conversational goals and possible directions of fit because interlocutors are protagonists in dialogues. In single contexts of utterances, the speaker is active while the hearer is passive. No speaker can commit someone else to an action by his personal utterance. He can only commit himself or give a directive to another agent. So language distinguishes two illocutionary points with the things-to-words direction of fit. When the utterance is commissive, the responsibility for changing the world lies on the speaker; when it is directive, it lies on the hearer. However, the speech-situation is entirely different in a collective deliberation. Any hearer is a potential speaker who can speak in his turn and make a contribution. Hearers can reply to speakers who give them directives and accept or refuse to commit themselves later. Often, speakers' commitments are conditional upon future hearers' commitments. So there is a single conversational goal while there are two illocutionary points with the things-to-words direction of fit. Deliberations serve both to commit speakers and to attempt to convince hearers that they should carry out reciprocal actions in the world.

All forces with the same illocutionary point do not play the same role in language-use. Sometimes it is better to advise than to command. Similarly all dialogues with the same conversational goal do not have the same function. Sometimes it is better to argue in favour of a position rather than just present it unilaterally. My typology decomposes discourse types into other components than their conversational

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goal. Many have a characteristic mode of achievement of their goal, requiring the use of certain means or a particular way of conversing. Inaugural addresses, weddings, contracts and promulgations of laws have a rather formal way of conversing. Most modes of achievement impose a certain sequence of major illocutions. In a written contract, parties must commit themselves to future reciprocal actions and officially agree by giving signatures. Discourse types impose conditions to their proper theme. A job interview must describe the professional qualification of the interviewee. Thematic conditions determine both forces and propositional contents of major illocutions. Deliberations of a jury must give a verdict. Interlocutors take for granted that preparatory conditions obtain in the background. For example, during a medical consultation, one presupposes that the consulted person has skills in medicine and the consulting speaker wants advice for his health. Finally, many discourse types require that protagonists express common attitudes. In order to exchange greetings, speakers must express courteous acknowledgements of the other's presence upon their encountering one other. Two language-games have the same discourse type when they have the same conversational goals, the same mode of achievement and the same thematic, background- and sincerity-conditions.

I have recursively defined the set of all possible conversation types and systematically analyzed their felicity-conditions. The *four primitive discourse types* are the simplest types with one conversational goal: *description*, *deliberation*, *declaration* and *expression*, common respectively to all descriptive, deliberative, declaratory and expressive language-games. I hold that *complex discourse types are obtained by adding new components to primitive types*. Thus the type of *negotiation* has a special mode of achievement of the deliberative goal: protagonists take counsel together as how to act. The type of *bargaining* has an additional thematic condition: protagonists negotiate the purchase and selling of certain things. The type of *peace talks* has a special background condition: negotiators represent belligerent parties and are authorised to conclude peace. Finally, *attempts of friendly settlements* have a special sincerity condition: negotiators express their will to come to an arrangement without animosity.

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Each discourse component determines a particular success-condition corresponding to a *constitutive rule*. Protagonists *succeed in conducting a discourse of a given type* during an interval of time when firstly, their theme satisfies thematic conditions of their type, secondly, they achieve the conversational goal on the theme with the required mode of achievement, thirdly, they presuppose that required background-conditions obtain and finally they express attitudes required by the sincerity conditions. Thus speakers *bargain* when they deliberate on a purchase and sale, (discursive goal and thematic conditions), they negotiate by making offers, counteroffers, acceptances or refusals of trade (mode of achievement), they take for granted that they are potential buyers and sellers (background-conditions) and they express their will to do business (sincerity conditions). Discourse types having more components than others have stronger success-conditions. Thus any negotiation is a deliberation. Bargaining sessions, peace talks and attempts at friendly settlements are negotiations.

Notice that success-conditions of discourses are not the sum of success-conditions of their successive illocutions. First of all, as Roulet (1990) pointed out, a dialogue is not to be divided immediately into the finite sequence of individual illocutions attempted in its successive utterances. In my view, a dialogue with a conversational type is rather a sequence of higher-order collective illocutions where speakers proceed to make salutations, presentations, take positions, respond in concert with one other, attempt to make a decision, argue and give justifications, make replies, comments, summaries and conclusions. The conduct of discourses with a conversational goal only requires the successful performance (and sometimes also the felicity) of *master illocutions* (Foster 1984) that are central for the common goal pursued by interlocutors. The form and moment of performance of such capital illocutions depend on *conversational type* and *theme*. Discourses must contain master illocutions with the direction of fit of their goal on their theme. Interlocutors make capital assertions in descriptions, and capital commitments and directives in deliberations. Yet forces and contents of master illocutions must satisfy thematic conditions. In bargaining sessions protagonists can make a lot of irrelevant and superfluous remarks. But they must make offers, counter-offers or refusals of sale or purchase and try to make a deal.

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Sometimes a master illocution terminates the discourse. A sales agreement is a way to terminate a bargaining session. Not all illocutions have the same importance. Only master illocutions matter. Superfluous illocutions can be unsuccessful and irrelevant. They do not prevent the successful conduct of discourses with a conversational goal. Because interlocutors keep their common conversational intention during such discourses, the requirement of relevance now imposes strong constraints on their structure and development. Interlocutors must cooperate and make appropriate capital contributions at appropriate moments. By definition, discourses with a direction of fit have *satisfaction-conditions*. As one may expect, their *satisfaction* depends on the satisfaction of their master illocutions. Descriptions are *exact* when their master assertions are *true*. Deliberations are *respected* when their master commitments are *kept* and their master directives *followed*. Declaratory discourses are *satisfied* when their master declarations are *successful*. Interlocutors can disagree and even contradict themselves. But they often argue and try to convince each other. They revise their positions or vote to make a decision. So they sometimes come in the end to an agreement.. When protagonists agree on how things are or on what to do, their descriptions and deliberations have a happy ending. However the theory of success requires less than felicity and good performance. Successful discourses can be bad, made in the wrong background, defective and unsatisfied. See my next book *Speech-Acts in Dialogue*.

Until now, theorists of conversation have neglected conversational goals. Many have distinguished good and bad discourses of certain kinds. But few have recognized that dialogues are collective illocutions of higher order provided with felicity conditions. Analysts of conversation (Schegloff) have empirically analyzed recurrent models of verbal interactions such as the rules for taking turn in any conversation. Some linguists (van Eemeren, Jucker, Atkinson and Drew) have analyzed dialogues with a conversational goal such as argumentations, linguistic exchanges in court, job interviews, newscasts and lessons at school. Philosophers have studied the nature of scientific discourse. Logicians have studied the nature of mathematical demonstrations (proof theory). Such investigations are useful but restricted. Others have adopted a more general approach and analyzed

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various types of discourse. Geneva linguists (Roulet) used the hierarchical model of exchanges. Hans Kamp constructed a formal theory of discourse representation most useful to characterize themes. Sperber and Wilson have studied relevance. But most have ignored discursive types. In my opinion, one should reinforce the theoretical approach to conversation by integrating semantics and pragmatics within a general formal discourse pragmatics studying the logical structure and dynamics of all types of dialogues with a proper conversational goal. A discourse pragmatics too dependent on the terminology of ordinary language and deprived of theoretical vocabulary is not advisable.

Which resources does language put at our disposal in order to conduct dialogues? There are a lot of *conversation verbs*, including *performatives* (Austin's *expositives*). One can proceed to a reasoned lexical analysis of conversation verbs on the basis of my typology. There is no one-to-one correspondence between discursive types and conversation verbs just as there is no one-to-one correspondence between illocutionary forces and performative verbs. Verbs like "inform" and "bet" name both a discourse type and an individual illocutionary act that is capital in such discourses. Conversation verbs such as "reply" and "conclude" name parts of discourse without a proper conversational goal. A reply can be of any goal. Certain conversation verbs like "debate" and "argue" are ambiguous. Argumentations in favour or against a certain thesis are descriptive, argumentations in favour or against a certain course of action are deliberative. When a conversation verb is ambiguous, discursive types corresponding to it share certain features. Protagonists who argue try to convince each other. This is a special mode of achievement of argumentations.

In order to contribute to the foundations of discourse pragmatics, it is important to further analyze like Searle and Tuomela the nature of collective attitudes and actions in philosophy of mind and action. Dialogues with a conversational goal are *joint illocutions* whose conduct requires a specific *constitutive collective intentionality* and *cooperation* between interlocutors. How do speakers come to share the same conversational intention and to coordinate their contributions? Do they negotiate conversational types?

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According to which principles do they choose their way to perform intended illocutions? How does conversational background intervene? We revise and revoke previous attitudes and illocutions when they turn out to be defective or insatisfiable. **Paraconsistent** and **non-monotone logics** (da Costa, Prakke & Vreeswijk) are most useful to characterize how we reason when previous information turns to be incomplete, false or even inconsistent. We also have to exploit new developments in **dialogical logic** (Lorenz, Hintikka, van Benthem) in order to characterize the proper dynamics of dialogues whose goal is discursive. The goal of dialogues of standard dialogical logic is to check whether an initial assertion is or not valid. One should better characterize the illocutionary nature of moves permitted in such dialogues. Not all defences are categorical assertions. Some are conditional assertions. Moreover attacks are directives. With M. Paquette I will use **game theory** (Von Neumann) in order to develop a *qualitative theory of decision* defining a *choice value* in a way comparable with the Bayesian theory in terms of a hierarchical set of preferences and a probability structure (Doyle) rather than probability functions. Our aim is to define success (the existence of a solution) as Nash equilibrium for simple dialogues with a conversational goal. I also plan to use the theory of discourse representation in order to analyze *conversational theme* and *background dependence* of attempted illocutions. In considering utterances within exchanges, discourse pragmatics gives a new prospect to the theory of meaning which becomes more dynamic and collective. Speakers can *clarify* the meaning of previous utterances and give them a new interpretation.

REFERENCES

- Austin, J.L., 1962, *How to Do Things with Words*. Clarendon Press
- Belnap N. *et al.*, 2001, *Facing the Future Agents and Choices in our Indeterminist World*. Oxford U.P.
- Cherniak C., *Minimal Rationality* MIT Press, Bradford Books 1986

Towards a Formal Pragmatics of Discourse D. Vanderveken

- Cocchiarella N., 1997, Formally Oriented Work in the Philosophy of Language. In J. Canfield (ed) *Philosophy of Meaning, Knowledge and Value in the 20th Century*. Routledge, 39-75
- van Eemeren F.H. & R. Grootendorst *A Systematic Theory of Argumentation* Cambridge U.P. 2004
- Fotion N., 1984, "Master Speech Acts". *Philosophical Quarterly*, 21, 232-243
- Frege G., 1977, *Logical Investigations*. Yale U.P.
- Goldman A.I., 1970, *A Theory of Human Action*. Princeton U.P.
- Grice H.P., 1989, Logic and Conversation. In P. Cole & J. Morgan (eds), *Syntax and Semantics* (Volume 3). New York Academic Press, 41-58
- Kamp H & U. Reyle, 1993, *From Discourse to Logic*. Kluwer
- Kaplan D., 1989, "Demonstratives" in J. Almog *et al.*, *Themes from Kaplan*. Oxford U.P, 481-563
- Montague R., 1974, *Formal Philosophy*. Yale U.P.
- Prior A.N. *Past, Present, Future*. Oxford, Clarendon Press, 1967
- Roulet E., 1992, "On the Structure of Conversation in Negotiation" in Searle J.R. *et al.*, 1992, *On Searle on Conversation*. Benjamins, 91-99
- Searle J.R., 1992, Conversation. In Searle J.R. *et al.*, 1992, *On Searle on Conversation*. Benjamins, 7-29
- Searle J.R. & D. Vanderveken, 1985, *Foundations of Illocutionary Logic*. Cambridge U.P.
- Sperber D. & Wilson D., 1986, *Relevance*. Harvard U.P.
- Thomason R., 1984 Combinations of Tense and Modality. In D. Gabbay & F. Guenther (eds.), *Handbook of Philosophical Logic* (Volume 2), 135-165
- Tuomela R. "Two Basic Kinds of Cooperation" in D. Vanderveken (ed) 2005
- Vanderveken D., 1990-91, *Meaning and Speech Acts* (Volumes 1-2). Cambridge U.P.
- 1997, "Formal Pragmatics of Non-Literal Meaning". *Linguistische Berichte*, 8, 324-341
- 2001 "Illocutionary Logic and Discourse Typology". *Revue internationale de philosophie* n°216, 243-255
- 2004, "Success, Satisfaction and Truth in the Logic of Speech Acts and Formal Semantics" in S. Davis

Towards a Formal Pragmatics of Discourse D. Vanderveken

& B. Gillan, *Semantics A Reader*. Oxford U.P., 710-734

2005, Attempt, Success and Action Generation: A Logical Study of Action Generation. In D.

Vanderveken (ed.), *Logic, Thought & Action*. Springer, 315-342

2006, « Croyances, certitudes et rationalité minimale des agents humains ». *Psychologie de l'interaction*
n° 21 & 22, 13-44

Wittgenstein L., 1958, *Philosophical Investigations*. Blackwell

Von Neumann & Morgenstern *Theory of Games and Economic Behavior* Princeton U.P. 1944