FOREWORD

When the contributions in this volume were written, we intended to present them to Maurice Gross at some festive occasion such as a birthday or a conference. They are numerous and diverse, as are the friends and collaborators of the great linguist. Probably most of the authors were eager to discuss their article with him, once published. But the text editing was a long job. He became ill, and his condition worsened. Christian Leclère made a tremendous effort to present him with a preliminary version, and Maurice Gross was fortunately able to take a glance at it before he passed away in December 2001. These articles, which were written for a living and vital man, are now published to pay homage to his memory.

We have added the list of references to his works, as established by Takuya Nakamura. We also mention references to some of the texts that were published to his memory in 2001 and 2002.

The academic life of Maurice Gross was prolific and rich in innovation. He had a reputation as an anti-conventional linguist. He questioned traditional views and challenged traditional ideas, and not for mere provocation. It is an epistemologically healthy attitude, as long as it is applied to oneself. In this foreword, I shall set out and defend some of his views, in an attempt to illustrate the originality of his methodology and results. Of course, I shall be paraphrasing what he has already said. Almost all examples quoted will be his or by members of his team; the issues that I shall mention are exemplified and discussed in more detail in Maurice Gross' books and articles.

Model and reality in syntax - 'Mr. Gross' empiricism'

The major contribution to linguistics made by Maurice Gross is of a methodological nature. He was the first to adapt and apply to the syntax of natural languages methods borrowed from experimental sciences. In my view, his originality explains the major impact he had on the linguistics of the 1970's; most of his contemporaries testify to his charisma, but that does not account fully for his lasting influence.

Let me be more specific. In the field of syntax, the degree of generality of facts or rules is felt to be a core measure of success. An assertion about the syntax of languages can be general in several ways. If it applies to a particular language, it can have some degree of generality with respect to words and constructs in the language. For example, in English, nearly all sentences contain at least one verb. If the assertion applies to all human languages, it is celebrated as a 'universal'. Here are two simple examples of informal universals about language evolution: (i) Many lexical words evolve until they become grammatical words, but the opposite trend is rare; (ii) Words with concrete or physical meanings acquire abstract or psychological additional meanings much more easily than the reverse.

In contrast with a general assertion, a 'directly observable fact' applies to a particular sequence of words or pair of sequences. For example, the preposition that occurs in *Max has some influence on Mary* is not acceptable in **Max influences on Mary*.

As in all sciences, there is a duality between general or even universal rules, and particular facts. Theoretical conjectures, which by definition are stated with fairly general applicability, can provide a reason to search for particular examples or counter-examples, which are directly observable pieces of information. Conversely, an accumulation of particular observations is a source of inspiration for shaping new theories.

The recognition of the duality between theory and fact, and the view that there is a synergy between the two, are widely accepted in epistemology; they are even a stereotype. In syntax, how can this synergy work in practice? Here, Maurice Gross' methodological approach was innovative, in that it was akin to methods practised in experimental sciences, whereas the attitude of most syntacticians is influenced more by mathematics. These divergent philosophies are not necessarily explicit, nor even conscious, but they are highly significant.

The popular view has it that the more general an intuition is about language, the more valuable it is. A very general assertion is better than a specific assertion. The best assertions of all have universal applicability. The analogy with mathematics is striking: if a theorem states that some infinite set of entire numbers are primes, it becomes unnecessary to prove that one of these numbers is prime. This way of thinking thus leads us to focus on the most general assertions possible. Intuition is naturally quite creative of generalities, and this activity is an intellectual pleasure. The prestige of what is "general" is further enhanced in two cases: one, where it is felt to be 'explanatory'[1], and two, where it is complex or abstract, thus acquiring an aura of mathematics, the supreme science. One of the most derogatory terms used in syntax, *ad hoc*, means "insufficiently general".

This view that general assertions are highly valuable is correct, on one condition: even if an intuition about language is general, explanatory and abstract, it must be tested against specific, individual facts. Each of Maurice Gross' works provides several examples of this basic requirement; his 1979 article in *Language* points out cases where syntacticians neglected it. Indeed, the danger of over-valuing generality lies in overlooking the duality between theory and fact. In syntactic study, real language use is the only means of verifying conjectures, hypotheses and models. It involves millions of observable facts, and thousands of languages. However, few linguists seriously contemplate the possibility of exhaustive investigation. Words like *descriptive* and *empirical*, which relate to experimentation, can actually express disapproval, i.e. in *descriptive adequacy*, as opposed to *explanatory adequacy*. Some linguists sincerely believe that unconscious introspection is an adequate means of authentication of general assertions, and omit to check them consciously.

The problem is different in mathematics: there are formal axioms, and there is a notion of formal demonstration on the basis of axioms. Thus, the analogy with mathematics does not necessarily entail the methodological stance of focussing on general assertions. I think that the lack of familiarity of many linguists with hard sciences has some responsibility for the popularity of this practice. Moreover, mathematicians do not make the same mistake. There are famous confusions between conjecture and theorem, but they are exceptional. Fermat's Last Theorem and the 'Four Colour' Theorem were traditionally called "theorems" before they were proved, but this was only a word: the mathematical community definitely considered them conjectures for decades. The 'Four Colour' Theorem was called a theorem because of the publication of a wrong proof. As soon as the defect of the proof was pointed out, it was clearly a conjecture again. In addition, the proof of the 'Four Colour' theorem required the examination of millions of cases, which was done explicitly before it was back among theorems.

The work of Maurice Gross is in many respects a reaction to that epistemological attitude. He graduated as an engineer and a scientist. In experimental sciences, priority is given to

[1] The significance of the explanatory value of general representations of facts has been theorized in the form of the three levels of adequacy of generative grammar: explanatory, descriptive and observational adequacy.

accumulating empirical data in order to design and test models, theories and conjectures; humility before the fact goes without saying. Even when models or hypotheses naturally come to mind, their scientific value depends on their correspondence to reality, so they must be systematically checked against observable facts. This involves experimentation. In syntax, as in any field interest, experimentation requires effort and skill; it must be explicit and take into account large-scale data; namely, the vocabulary of the language and the syntactic constructions of the language. This is one of the fundamental principles of the Lexicon-Grammar method of Maurice Gross. The following examples illustrate some applications of these principles.

Predicates and arguments

The predicate/argument model is one of the most general models of sentence structure because it applies to many languages and many types of sentence. Let us state it in terms of mathematical combinatorics on words: many elementary sentences can be accounted for by sentence schemes of the form $P_0A_0P_1A_1...\ A_nP_{n+1}$, where the concatenation $P_0P_1...P_{n+1}$ represents a particular predicate, and $A_0, A_1,... A_n$ free arguments. For example, in

Max takes Mary under his wing,

the predicate is $P_0P_1P_2$ =: *take under Poss*^{0} *wing* and the two free arguments are A_0 =: *Max* and A_1 =: *Mary*. Fundamental syntactic issues surrounding the predicate/argument model involve an extensive empirical study of the vocabulary:

- Does it apply to all elementary sentences?
- What is the extension of the predicate in the sentence?
- When there are several arguments, is their distribution independent?

As regards the second issue, a long tradition holds that the predicate is the verb:

King John attacked the city

Zellig Harris[2] formulated a theory of derivation that implies the existence of nominal and adjectival predicates:

King John launched an attack against the city
Max is faithful to Mary

The description of nominal and adjectival predicates by Maurice Gross and his followers validated Zellig Harris' approach. The discovery of a large set of compound predicates (*Max takes Mary under his wing*) was not a predicted by a theory, but uncovered as a result of the systematic study of the lexicon.

The question as to whether arguments have independent distribution is significant, because the predicate/argument model loses much of its interest if arguments have interdependent distributions. There are examples where it seems to be the case:

The lady swallowed (a whitebeam berry water-ice with banana + ? the anaconda)
The alligator swallowed (? a whitebeam berry water-ice with banana + the anaconda)

but it is not clear whether these constraints are linguistic or extra-linguistic. The model according to which arguments have independent distributions is an approximation to reality. It is a convenient descriptive framework that has led to interesting results and is far from being exhausted, even for French. It would therefore be unreasonable to consider this model obsolete.

[2] Harris, Zellig. 1964. *The Elementary Transformations*, Philadelphia: University of Pennsylvania.

Finite automata

For Noam Chomsky, the finite automaton was not the best formal model for the syntax of natural languages; it was too simple. He represented his viewpoint in the form of the sketch of a mathematical proof[3], and though the sketch has never been extended into a complete proof, many still believe today that it might be. Even if it were, such a mathematical proof would hardly be relevant, since the total evidence exists out in the real world and is not straightforwardly transposable into an axiomatic domain.

Maurice Gross' approach to the finite automaton model was more constructive. He perceived that it would be a convenient, invaluable tool for syntactic description, and that the taboo imposed was absurd. Empirical study in the framework of Lexicon-Grammar led to the design of an actual model of the syntax of natural languages in the form of... a large network of finite automata.

New transformations

During the systematic investigation of the French lexicon undertaken by Maurice Gross' laboratory, new transformations have been discovered. The following is a case of conversion:

Max gives his consent to this manipulation
= *This manipulation receives Max's consent*

The transformational status of several other relations between sentences might have remained unclear without such a systematic review of their productivity. The following is a case of object transposition:

Max sprays repellent on his ankles
= *Max sprays his ankles with repellent*

The study of such syntactic relations provided key arguments for elaborating formal models of sets of syntactic variations[4]. Theory stemmed from experience, since choices about the properties of formal models required taking into account empirical facts about hundreds of sentences.

Reproducibility

Let us return to properties which have some degree of generality, and to the question of assessing the limits of this generality. Take for example the following assertion. Many neutral constructions present an intuitive semantic difference between a construction with an implicit external human agent (the "ghost agent") and a construction without an implicit external human agent:

This door opens easily

[3] Noam Chomsky. 1956. "Three models for the description of language", *IRE Transactions on Information Theory* 2:3.113-124.
[4] Salkoff, Morris. 1983. "Bees are swarming in the garden: a systematic synchronic study of productivity", *Language* 59:2.288-346.

The door opened

Any hypothesis as to the degree of generality of such a fact has the status of a conjecture until it is supported by evidence, which in this case is bound to be empirical. Maurice Gross took care to base descriptive or classificatory choices on criteria liable to give results without resorting to double-bind experiments, obviously too costly. Reproducibility of experimentation is an essential requirement; it is ensured when the result of an experiment does not depend on the experimenter, which is of course never entirely true in the case of language, but can be approximately so, in so far as there are linguistic communities. However, the result depends heavily on the criteria adopted. Formal criteria make use of forms, their acceptability, their differential acceptability and a few other notions; they are usually much more reproducible than those that simply refer to semantic intuitions: even if these seem clear and sound, they may be reproducible for some words and not for others. For instance, the status of the following sentence with regard to the difference perceived so clearly above is not detected in a reproducible way:

The second theory naturally relates to the first

The systematic description of the neutral transformation(s) remains to be done, largely because of this difficulty. In general, the practice of semantic description and formalisation within the Lexicon-Grammar framework involves methodological caution; I would justify it by saying that caution is a condition of rigour.

In the same vein, methodological precautions restrict the scope of Lexicon-Grammar as regards the description of lexical ambiguity and of idioms.

Lexical ambiguity

Ambiguous words, like *miss*, give rise to questions and intuitions about connections between senses, about the historical evolution of senses... but this field can hardly be formalized and such intuitions are difficult to reproduce. Maurice Gross avoided this field and excluded it from his model of syntax. This exclusion is based on a theoretical and methodological principle, which originates in Zellig Harris' conception of syntax, and that Maurice Gross stated as follows: the elementary sentence is taken as the minimal unit for the study of meaning and syntax. As a matter of fact, meanings of sentences are much easier to distinguish than meaning of words:

Max missed the target
Max missed collapsing
Max misses Mary

This principle also means that when an ambiguous word, like *miss*, occurs in different elementary sentences with distinct meanings, the respective lexical entries are considered separate and unrelated. Thus, relations between homographic entries are usually not addressed in Lexicon-Grammar studies. This is the price to be paid for an essential epistemological feature: the model is designed so as it can be confronted with reality through a set of sufficiently reproducible experimental processes, which includes acceptability judgment, differential acceptability, paraphrase judgment, ambiguity judgment, and a few others, all applied to sentences.

Idioms

Figurative and metaphorical senses are fascinating for linguists. These linguistic features stimulate intuitions about metaphorical creativity, connotation, historical evolution, etc. Maurice Gross was a pioneer in the syntactic description of idioms and produced comprehensive lexicons of French adverbial and verbal idioms. However, in his practice of syntax, he focussed on those phenomena that allow formalisation, even if they do not attract intuition. For example, figurative idioms such as *take to heart*:

Max took this delay to heart

do not behave in an essentially different way, from the syntactic point of view, from the idioms that are not particularly figurative, like *take into account*:

Max took this delay into account

or from those that belong to the technical vocabulary, like *free on parole*:

The court freed Max on parole

Explanations

Maurice Gross' attitude towards explanations was strikingly prudent, as compared to many linguists.

Linguists use the word *explanation* in at least three ways. Firstly, a simple correlation between two facts is often termed an explanation. For example, the two following sentences illustrate a difference of acceptability:

The branch broke
? *The branch bent*

Some speakers connect this difference with the fact that the existence of an external cause is necessary in the situation denoted by the second sentence. This semantic and pragmatic difference is said to explain the difference of acceptability. However, it does not properly explain it, as long as no logical connection is shown between the two facts. (Moreover, the utmost caution is required with regard to such impressions, on the basis of scientific doubt; a correlation is often less general than it is felt to be, as is shown by other examples, like:

The branch burnt

which is quite natural although an external cause is definitely required.)

Secondly, saying that a rule or a theory explains facts sometimes just means that the facts do not contradict the rule or the theory. For example, if we connect predicative noun phrases to support-verb constructions and if we describe:

John had a surprise

as a support-verb construction, we explain the noun phrase:

John's surprise

With this notion of explanation, a theory has a great explanatory power simply if it is compatible with a lot of facts.

Thirdly, an explanation, in the proper sense, is a logical relation of causality. For example, the different inflection of *to win* and *to gain* is explained by their Old English and French origins respectively. This kind of explanation is actually informative and satisfactory.

However, it is usually of an historical nature, and therefore often unavailable. In particular, explanations of precise lexico-syntactic facts are likely to be quite contingent and almost always impossible to obtain, for lack of documentary evidence.

Formal and terminological minimalism

Maurice Gross agreed fully with Zellig Harris' aim of building a formally minimal theory, and limiting the introduction of abstract notions. He demonstrated the same inclination when he himself created and applied models. These models are among the simplest in existence and make use of very little mathematics, though he was a specialist in formal modelling and his intellectual partners in the 1960's were very active in mathematics: Zellig Harris, Marcel-Paul Schützenberger, Noam Chomsky.

Zellig Harris[5] changed the notion of syntactic fact in transformational grammar by making relations between sentences the central point. In traditional and generative grammar, a large proportion of grammatical information is attached to surface structures, i.e. abstract constructions associated with observable syntactic constituents: noun phrases, verb phrases, various types of complements... Maurice Gross adopted and implemented Zellig Harris' view by attaching syntactic information to relations between sentences rather than to surface structures or to deep structures. Syntactic information identifies acceptable constructions, their relations and their meaning variations. Since this information depends on the lexical items and different syntactic constructions, it is straightforward and natural to associate it with transformations (relations between constructions) and with relations between lexical items and constructions. Lexicon-Grammar uses a small number of surface structures: sentence, noun phrase, lexical tags, and so on. This economy in structure facilitated the comprehensive description of syntactic variation.

The difference with generative grammar is striking in this regard. Generative grammar embeds numerous kinds of syntactic structures within one another: for instance, the noun phrase is distinguished from the prepositional phrase, and the sentence from the verb phrase; in addition, these surface structures are duplicated into a piling up of tree nodes; complex syntactic information is attached to them. In practice, these choices do not favour effective large-scale descriptive syntax.

Maurice Gross seldom resorted to theoretical sentences in syntax. Here are a few exceptions for French:

*Luc sort (du + *de le) camion*
*Je veux (me promener + *que je me promène)*

He created very little terminology: *link operator*, *uniqueness modifiers*, a few categories of *determiners* (*adjectival, nominal, adverbial, predeterminer*), some syntactic transformations ([*se* passive]) - hardly any more than these. He was careful about the definition of notions and the use of existing labels, but considered that creating a label for a new notion or a new combination of properties was often useless; and arguing about which label should be created, even more so.

Parsimony in syntactic description

The attitude of Maurice Gross towards parsimony in syntactic description was pragmatic. When several solutions are equivalent as regards their informative content, he saw the choice

[5] Harris, Zellig. 1957. "Co-Occurrence and Transformation in Linguistic Structure", *Language* 33:3.283-340.

of the simplest as more a question of good sense than of mathematics. In other words, he thought that in such situations, better decisions are reached on the basis of a human, informal choice than on formal grounds.

The choice can even be quite arbitrary. When a lexical entry is losing or acquiring a construction attested with other entries, two approximate models can be envisaged: either the obsolescent item is present in the model or it is absent.

La façon dont Marc présente les choses est diplomatique
"The way Mark puts it is diplomatic"

= ?*Marc est diplomatique* (cf. *Marc est diplomate*, more standard)
"Mark is diplomatic"

Wherever this evolution is taking place, the choice is arbitrary. The same can be said more generally when one system of forms is reorganised into another: it is possible that no intermediate system can be represented simply in a formal model.

The issue occurs more frequently when several formal models for a given set of data can be devised. For example, the notion of verb phrase that is traditionally used in generative grammar includes the verb and its complements, subject excluded. Using this structure certainly simplifies a number of operations, but doing without it simplifies others. A structure that would combine subject and verb, complements excluded, would certainly simplify others. In principle, generative grammar provides a definition of the simplest device describing a set of linguistic phenomena, but it is purely theoretical and cannot be practically applied. In mathematics, a choice between notational variants is usually considered as an arbitrary choice, and is made, in fact, on practical grounds. In our example, the choice between the three solutions involves practical considerations. For example, the structure with no intermediate tree node between sentence and predicate or constituents is obviously simpler. One of the arguments in favour of the traditional syntactic tree with a verb phrase node is that it can be used to encode properties of adverbs:

Max probably accepted the proposal
Max enthusiastically accepted the proposal

by attaching different kinds of adverbs to distinct nodes. However, the same properties are more naturally attached to relations with syntactic variants of the sentences. Another fact is that specialists in Lexicon-Grammar actually described thousands of predicates and dozens of syntactic transformations without noticing how the notion of verb phrase could be helpful. This result is an *a posteriori* confirmation of the wisdom of Maurice Gross' choice of dispensing with the notion of verb phrase.

Targeted use of the computer: 'Mr. Gross' pessimism'

Maurice Gross designed linguistic data so that a computational exploitation in natural language processing was possible. He pioneered the concept of linguistic-based natural language processing. The data he accumulated is used by several laboratories and companies, some of them founded by his followers.

However, he had a clear position as to the role to be assigned to computers in syntactic description: computers are suited to the exploration of texts and to the organization and processing of data, but not to the syntactic description itself; syntactic description is not automatable. Computer science provides comfort and aid but not a real shift from handcrafted activity to mechanisation.

This theoretical position brought Maurice Gross into lengthy conflict with language-processing computer scientists, who basically adapt weather-forecasting-type techniques to the description of syntax. They obtain predictions of syntactic behaviour in order to use them as a substitute for syntactic description. In the case of meteorology, when all relevant fundamental data are observable: temperature, humidity, nebulosity, precipitation, wind, currents etc., at points that make up a sufficiently dense network in space and time, weather forecasts are reliable. In syntax, the only primary data that can be automatically acquired from samples of texts are sequences and forms of words, but not sense distinctions or paraphrase relations. These data are partial and offer a simplistic model of syntax, but the approximation seems satisfactory, or at least promising, to computer scientists with an engineering background but little familiarity with linguistics.

But the two positions have grown closer over recent years.

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The authors of the contributions in this volume are from different schools of thought and from different continents. They do not share all the views I have recorded here. However, all of them had a close relationship with Maurice Gross, and they have taken the opportunity to express their position on significant views of his.

Those who worked with Maurice Gross, and those who wish to remain faithful to all or part of his ideas are now responsible for carrying on the legacy of work which he initiated and did not complete. I hope that we shall be creative and rigorous in this enterprise.

Paris, May 2004

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