NETWORKS AND GENERATION IN SYSTEMIC-FUNCTIONAL GRAMMAR

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1. In a recent paper R.Hasan (1987) brillantly traces the line of development that modern linguistics must necessarily follow if it wants to survive at all in the rapidly changing scientific scene. And she does mean "survive", since the present panorama is deadly wounded, according to her, or as she dramatically puts it, "fraught with mortality".

The uprooting of structuralist ideas at the hands of a new trend (transformational grammar: TG for short) with a bag of new notions like competence, infallible rules, ideal speakers and inborn ideas was so cataclysmic that a gap grew between two parties: the pro-TG and the rest.

Some of "the rest" now raise their voice claiming that the basic tenets of TG are so highly abstract and formally idealized that they are unable to answer many of the questions of how language works in human communication.

Therefore, some of "the rest" denounce the short-sightedness of the aims of TG in its account of language phenomena, in their social as much as in their psychological implications.

An unfortunate consequence of the deeply rooted idealization in the treatment of language, advocated and developed by the first structuralists, and dating back to their founder F. de Saussure(1916), was the view of language as a system separated from its actual use ("langue" as independent from "parole") and common to all language users ("une langue une" or in Meillet's words "un système où tout se tient").

This approach was closely followed by Chomsky and most TG oriented linguists till today. Some of his critics have pointed to what his view ignores and fails to explain, whatever its undeniable achievements and insights. Thus Moore and Carling (1982:65) critically single out the following measures Chomsky had to take in order to posit his deductively formal theory:

(i) separate form from meaning and concentrate on form.
(ii) assume counterfactually that speech communities could be homogeneous.
(iii) isolate language as a system from language users.

Precisely these same points are the basis for the criticism Hasan levels at the decaying structuralist doctrine and more specifically, at Saussure's most celebrated assumptions. To redress the balance, she spares no word of praise for the founder of the Prague School, Vilem Mathesius, whose work, undoubtedly worthy of reappraisal, counters some of Saussure's most negatively influential and hitherto unquestioned

tenets.In particular she stresses those paragraphs in Saussure that most outstandingly reflect his idea of "homogeneity" and "indeterminacy" of language.

Consequently, the structuralist conclusion suggests that the "chaotic" facts of language are not amenable to scientific formal analysis. As Hasan (1987:117) put it:

> Ideologically, the regularity of parole cannot be maintained; theoretically,the existence of some regularity cannot but be invoked; and, again, ideologically order and chaos -homogeneity and heterogeneity - cannot be the characterising attributes of the very same phenomena.

1.1. For the founder of British modern linguistics, J.R.Firth, homogeneity was, however, an alien notion. He envisaged linguistic analysis as a method of "making statements of meaning". *Meaning* was the true objective and the ultimate aim of language investigation. However, meaning was the most elusive of goals, being scattered throughout a variety of "dispersed modes" rather like "the dispersion of light of mixed wave-lengths into a spectrum " as he aptly put it.(1957:192)

So "unity" was considered by Firth, and still is by his disciples, a concept to be rejected as harmful to the study of meaning, since, in Firth's own words again: "...we must apprehend language events in their contexts as shaped by the creative acts of speaking persons." (1957:193)

In a well known paper Firth directly attacks the foundations of Saussure's basic tenets, and there he unmistakenly expresses:

> We are now a long way from de Saussure's mechanistic structuralism based on a given language as a function of a speaking mass, stored in the collective conscience, and from the underdog, considered merely as the speaking subject, whose speech was not the "integral and concrete object of linguistics" (1957:183)

I would like to point out a close connexion of this last statement with previous assertions made by British linguists such as A.Gardiner or H.Sweet. What I suggest, and I am sure I am not the first to have noticed it, is the existence of a coherent historical line of received ideas concerning language at large.

Thus Gardiner(1951, 2nd ed), writing some years before the philosopher J.R.Austin put forward his theory of *Speech acts*, made the following remarks: "An act of speech, as conceived of in this book, is no mere set of words capable of being repeated on a number of separate occasions, but a particular, transient occurrence involving definite individuals and tied down to a special time and place". (1951:71)

Such a view strikes us as nearest to Firth's and the further developments of language theory carried out mostly by the London group and other British linguists trained under the guide of M.A.K.Halliday. But quite importantly, it also underlies the pragmaticians from Oxford and Wittgenstein's later writings.

1.2. The basic concept in the discussion of "meaning" as understood by the systemic linguistics is that of "choice" amongst available possibilities for a speaker in

a real context of situation. Such choices form a self-consistent system or paradigm, whose terms interact in *networks* of relations, i.e. the actual grammar of a language.

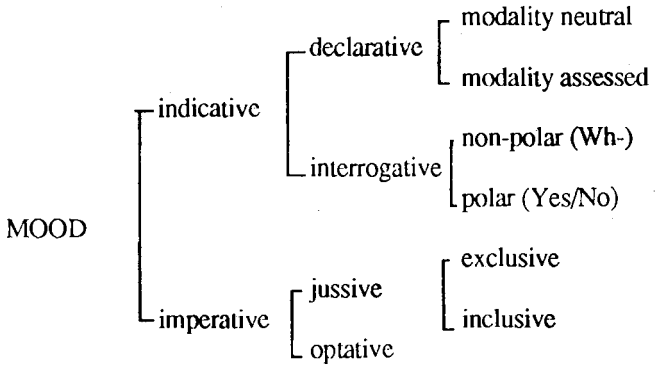
Berry (1975:144f.) discusses this point and foresees three essential properties of systems:

(i) The terms in a system are mutually exclusive

(ii) A system is finite

(iii) The meaning of each term in a system depends on the meaning of the other terms of the system.

Let us see a simple illustration of networks:



The terms are distinct, and are a unified meaning divisible into other more delicate meanings, as sets of options that preclude any other alternative term from being chosen. But also importantly, terms in a system share a common grammatical framework (clause) as an entry condition.

Two main differences I would like point out here between a standard TG approach and a SFG (systemic functionalist) one:

a) First, in making abstraction of individual speakers and setting themselves the job of just describing context-independent rules,the TG grammarians feel foreign to the concept of choice, simply because it's not their aim.In relying more on the specific social conditions (register) under which a concrete utterance (or text) is produced, the SF linguists show little or no concern for the formal rules governing the formation of a sentence.

b) Secondly, the leading role that TG linguists understandably attach to syntax as the basis of language is not recognized by SFG linguists, who think that form is subservient to meaning and therefore, all formal choices in their systemic variations have a correlate in semantics. Variation implies non-identity of meaning and wording, since language is inherently variable.

According to standard TG thought, however, the universality of formal grammars bears directly on the way linguistic knowledge is organised within language "ideal users". *Competence* refers to natural language in its idealized form while *performance* refers to anything else- a ragbag which includes all kinds of extra bits like mental blocks, subtle shades, overtones etc.

These two essential points make that they are two independent, almost incomparable views that, springing up from two divergent epistemological perspectives, should be seen as two mutually enriching contributions to western linguistics. Both can exploit their possibilities in accordance with their aims.

1.3. It is evident, then, that a SF grammar accepts a much lower degree of formalization, not entering into the distinction between competence and performance. Denying any value to the concept "competence", all manifestations of language are per se "performance", i.e. what the speaker *does* with his language. Halliday expresses his position thus: "There is no need to bring in the question of what the speaker knows; the background to what he does is what he could do-a potential, which is objective, not a competence, which is subjective" (1978:38). We have arrived at a key concept: a potential. A grammatical system is what a speaker *can say*, therefore operating as the realization of a semantic system, which is in turn what the speaker *can mean*. There is then a correlation between them both, which are themselves tied to a higher level semiotic of behaviour in the social level. SFG defines itself as a social means of communication which has evolved in a certain way because of its function in the social system. And, it is important to emphasize this point at this stage, language exists in the social system in the form of actual *texts*.

Halliday's words are again explicit here:

> There are many purposes for which we may be interested in the text, in what people do and mean and say, in real situations. But in order to make sense of the text, what the speaker actually says, we have to interpret it against the background of what he can say. In other words, we see the text as actualized potential.(1975:40)

Having made clear what the meaning of a system amounts to in a SFG, I would now like to explain how its internal networks actually function.

2. In full accordance with the Firthian "polysystemic" principle mentioned above (metaphorically expressed in the dispersion of light), in the mid-60s Halliday conceived of systems as paradigmatic set of choices, or system networks operating in the lexico-grammar at a particular rank point (clause,group,etc).

The systems are ordered according two two parametres:

a) simultaneity b) dependence.

In the first instance, two choices are made in two independent systems at the same time whereas in the second instance the terms in different systems form a hierarchy which constrain and condition the choices made. The notational conventions for the networks can be summarized in the following rule : "There is a point of origin which is an entry condition which can be simple or compound. If a term is selected, then an entry condition is recurring for further selections to the right."

As J.R.Martin has put it:«It is clear that if systemic grammars are to function as explicit generative models, then system networks must include at least those features necessary for generating well-formed structures in a given language.» (1987:16)

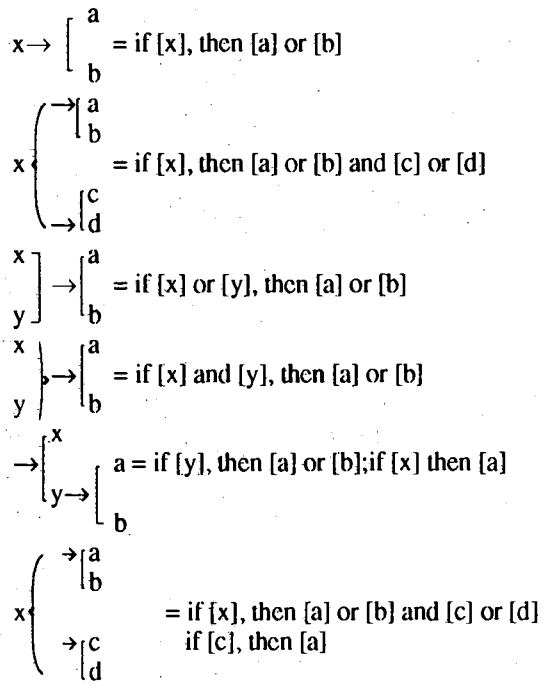
It seems evident then that features are focused as bearers of the meaning of the systemic choices, so they need to be motivated by well grounded criteria. One essential criterion in motivating a feature is that it should have a reflection in the syntagmatic structure through "realization rules".

The *realization rules* can be of four kinds:

a) Daughter dependency rules: [b] → [w] [c] → [w]
b) Sister dependency rules: [b]v[c] → [w]
c) Function assignment rules: [b] ↘ +Jm [c] ↘ +Jm
d) Sequencing rules: [b]v[c] → [w]

Here features [b] and [c] motivate a feature [w] only if some conditions hold, all of which are formulated from a) to d). In a SFG features are realized either through structures or lexical items.Both are valid as formal exponence.

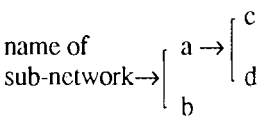
The *basic networks* can be given the following notational conventions characteristic in SFG analysis:



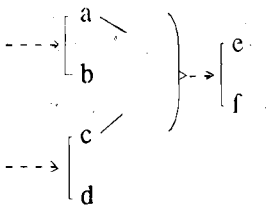
The relations specified in a system network are obviously deeper, and therefore abstract, than the relations expressed in a syntagmatic sequence. So the surface grammatical structure is but an instantiation or realization of the terms present in the deep grammar as expressed in the networks.

Dependence is perhaps more difficult to grasp from the iconic conventions of a network diagram. Three main ones can be specified:

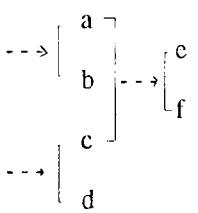
a) simple dependence:



b) conjunctive dependence:



c) disjunctive dependence:



2.1. The strong emphasis, one may wonder, laid on the system relations just shown, is not at the expense of the syntagmatic constituency?

In SFG, as Halliday (1985:7) has claimed, constituent structure is treated "as a small, though essential, part of the total picture". Ever since his early paper *"Categories of the theory of grammar"* (Word 17, 1961) the concept of *rank* is the basis of the bracketing relations in the syntactic structures, to which the functional labels are added. But the organizing principle of SFG far from being the sentence-oriented structure -like in TG -lies rather in the text-oriented system.

In this view then, the deep grammar of a text consists mainly of a set of features ordered in the scales of rank and delicacy, rather than a labelled constituent tree.

The grammatical description then, as is understood in SFG, is not that of a P-marker as in TG.

Firstly, the *scale of DELICACY* accounts for the choice of simultaneous or dependent features in a specific network. Thus, in the utterance:

(1) Did you hear the latest about interest rates?

The Clause has the features, following the diagram of the Mood network given above:

[*polar*] which presupposes [*interrogative*] which presupposes
in turn [*indicative*].

They are, therefore, dependent selections, chosen "later".
On the other hand, we have simultaneous choices:

[*indicative*] is independent of [*transitive*].

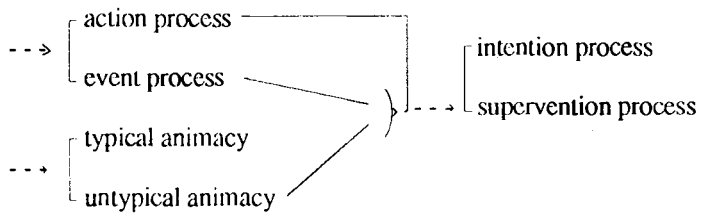
So one is not chosen "later" than the other, but simultaneously.

In the scale of delicacy, then, the choice is made between the terms of the righthand system only if a term has been chosen from the lefthand system (for further discussion cf.Berry 1975:Vol 1 Ch.9) For the sake of illustration let us consider an example of complementary points of entry from the transitivity system of the Clause:

(2) The roaring mob streamed down the lane

Two alternatives can be drawn: the choice of action process and the choice of event process combined with the choice of untypical animacy. So the realization is both in the axis of chain (syntagmatic) and the axis of choice (paradigmatic). Thus when we choose terms from systems we are making choices between different paths along the realization scale, which amounts to making choices among several possible meanings. Delicacy can similarly be regarded as relating to both chain and choice.

The notation set up by Berry (1975:188) would be:



2.2.The scale of *RANK* accounts for the structural units arranged in a hierarchy of size or status. The relationships established among the units can be paraphrased as:

x consists of *y* which consists of *z*

Each unit, therefore, consists of members of the units situated next below: a Clause consists of phrases, phrases in turn consist of words, and words consist of

morphemes. By contrast, the latter are said to be constituents of the former terms. Moreover, each unit can be complex:

Clause Complex - Phrase Complex - Word Complex etc.

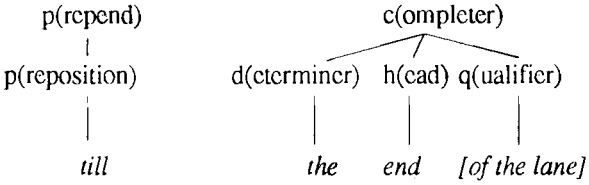
Consider the following examples of phrase (or group in previous terminology), where we have a dependent structure:

(3) He drove till the end of the lane late that night.

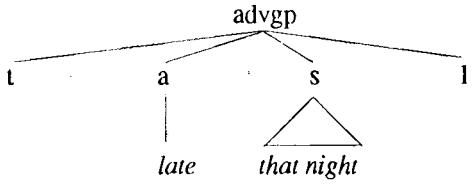
A first rank is represented by the structure:

S(subject) V(erb) A(djunct)^{loc} A(djunct)^{temp}

The first A-phrase is complex, as it consists of:



The second A-phrase is also complex and shows, according to Fawcett, a different structure than nominal phrases. He describes it with different labels (temperer, apex, scope and limiter) which he extends to the adjectival group.
Thus, he foresees the autonomous flat structure:



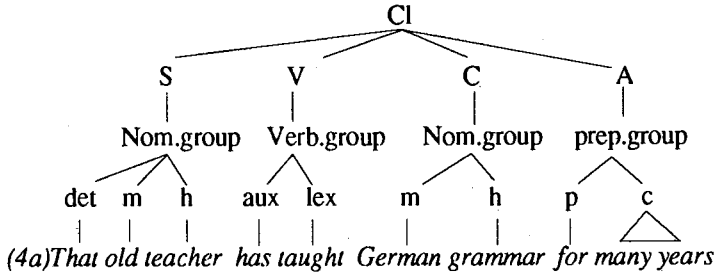
The rank-shifted phrase has yet another rank-shifted phrase within itself, which is analysed:

a) for the PP: q [p c[d h]]
b) for the AdvP: s [d h]

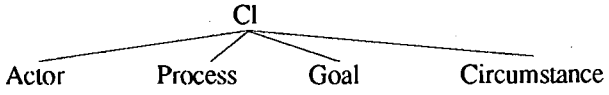
where both c and s have the power of a nominal phrase in the various possible realizations.

Structures involving rankshift are potentially recursive, which means that additional layers may be repeating the same sort of established pattern. Thus a unit acts as a member of the unit next below, as can be visually shown in the layers and nodes of tree diagrams. But there is a fundamental difference bewteen a RANKED constituent approach and an IMMEDIATE constituent one. They would yield the interpretations:

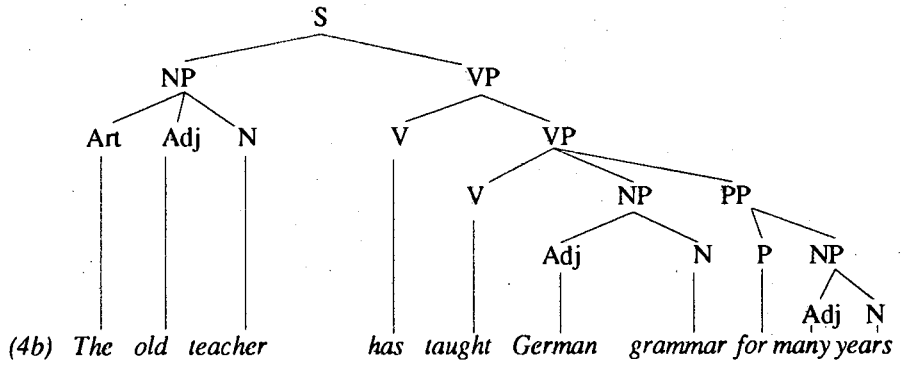
a) function-centred ranked constituents:



This analysis is called "minimal bracketing" (Halliday 1985) where we may note the *functional* labelling explicitly stated, and where the ranks of hierarchical constituents are all important. So each node corresponds to a unit on the rank scale. Besides, the labels indicate the class and the function. To the grammatical functions noted above we should then add the semantic functions any SFG must be able to describe. In (4) they should be:



b) rule-centred immediate constituents:



3. According to SFG interpretation of language, then, a grammar is not a "set of rules that generates the well-formed sentences of a particular language", as is the basic TG assumption. Rather, it may be defined as a *"systematic resource for meaning"* or *"a multi-level semiotic system"*. Hence the relevance of ranks in the description of lexicogrammatical realizations.

As Chomsky (1972:63) has argued "there is no reasonably concrete or well-defined theory of semantic representation to which one can refer. I will, however, assume here that such a system can be developed". One doubts, nevertheless, whether it is not through his approach how a comprehensive mapping of meaning and form could best be specified. In his theory the starting point is the syntactic structure $Z = (P_1,...,P_i,...,P_n)$ (where P_i is the deep structure and P_n the surface structure) to which a semantic representation S is added, together with a phonetic interpretation P. Moreover, in the standard TG theory, the semantic representation is determined by the deep structure and the phonetic interpretation, in turn, by the surface structure.

But SFG represents an alternative formulation which differs in empirical consequences. A Halliday's (1985:8) theoretical assumption states that "every structural feature has its origin in the semantics; that is, it has some function in the expression of meaning". From this assumption another one is consequently derived which is firmly grounded in systemic tradition, namely, that "the different types of structure tend to express different kinds of meaning, as embodied in the metafunctional hypothesis".

So although the core of the language is the lexicogrammar (a complex term indicating a conflation of syntax plus lexis plus morphology) as the most formally abstract level, it is crucially dependent on the so called *metafunctions* which determine which options are more likely to occur and with what frequency. Further still, Halliday (1978) assumes that variable speech (*actes de parole* en Saussure) represented by "texts" are *instances* of the systemic networks. The systems having the clause as their point of origin are then lumped together in three different organizational sets, which are the basic *functional* components of grammar:

a) Transitivity
b) Mood
c) Theme

As the theory claims, each component is oriented specifically towards a set of language uses. Halliday (1970:143f.) calls the three main components:

1. Ideational (transitivity and logical systems)
2. Interpersonal (mood and modality, and intonation systems)
3. Textual (theme and information, and coherence systems)

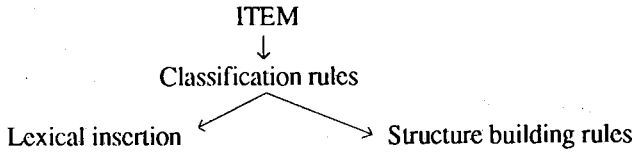
A fundamental characteristic of these three sets of systems is that, contrary to the classical ones proposed by K.Bühler or D.Hymes, they are in-built in the clause itself. It is not the case of an extra added to structure, but rather these functions determine the various structural possibilities.

3.1. As a result, a particular clause is represented in the grammar as a set of *features* from the three choices stated above plus the *realization rules* (Hudson 1974:13f.) The realization rules are ordered in a similar way to transformational rules. Surely the stronger power and restrictions of transformations must mean that TG heavily relies on them as essential in their way of tackling hard points of grammar. A conventional way then of generating a paradigm from a systemic network would be to posit an algorithm describing:

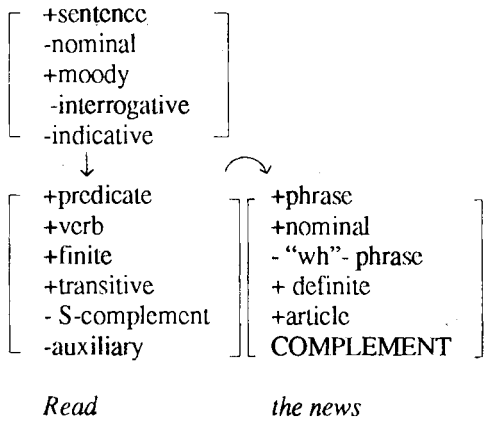
a) a nul structure premise (Z_0 = # #)
b) entry conditions for a network
c) elements of structure : feature realization rules
d) structure building rules: ordering of functions
d) function realization rules

This is based on Hudson's "English Complex Sentences" model, which proved to be rather impractical as far as the generation of possible functions is concerned at the output of the structure-building rules. (cf Butler 1985:106ff. for criticism) In a later model he developed (Hudson 1976), he explicitly states dependency relations (part-part relations), which were neglected in previous systemic models in favour of constituency. He called it *DDG* (daughter dependency grammar) which in explicit diagrammes shows the "daughter" and "sister" dependencies. The generation of structures by a *DDG* consists firstly of a set of rules classifying systemic networks and secondly a set of rules realizing the syntactic form. The rules operate in a cyclic way depending on the IC layers. Needless to say, this approach comes nearer to a syntactically based TG than to a pure *SFG*.

3.2. But it is noteworthy that Hudson is also, like TG, very explicit about the lexical insertion rules, where items are provided with all sorts of specifications. No doubt this decision paved the way to later developments of his theory which has ended in a *Word Grammar* (Hudson 1984). For him the grammar generation is based on the following stages /layers, with rules to comply with:



Notice that the direction of arrows mark off the order of procedures in generation. Quite importantly, the structure building rules (up to six kinds) revert on the previously considered classification rules. Amongst them are the function assignment rules, also specified. Let us see a typical DDG diagramme with features selected from the systems with a + or - realization:



Briefly, the explicitness of relations enables this sort of grammar to accomplish the generative requirement quite effectively. Also the formal recognition of "sister dependencies" (see marked arrows) allows the DDG to aptly predict the sequence rules not accounted for explicitly in other grammars.

But we are now somewhat apart from the streamline SFG where the macrofunctions have a significant role to play. As Halliday has rightly claimed:

> For a linguist, to describe language without accounting for text is sterile; to describe text without relating it to language is vacuous. The major problem perhaps is that of interpreting the text as process, and the system as evolution (its ontogenesis in the language development of children): in other words, of representing both the system and the instantiation in dynamic as well as in synoptic terms (1985:10)

One hardly needs to add that such a goal is the "unachieved target" at which all the SFG arrows aim. Many insightful studies are being carried out, yet all seem to be bound to fall short in their aspirations. The reason is that dynamic models of semiotic systems are still in wait to be pushed beyond the starting few yards of the long run ahead.

4.A SFG linguist who has made great efforts to carry things a little beyond the current state of affairs is R.Fawcett.

He is directly concerned with the semantics of a formal grammar, where such pragmatic, mental representational data as "inference" or "presupposition" form part of the semantic load. Needless to say, we are faced here with an indeterminate, fuzzy area which, according to Chomsky, is "veiled in obscurity and confusion". Fawcett, nonetheless, far from being inhibited by the intra-organistic bias of formal linguistics where everything is to be explained disregarding all alusion to context or interpretants, extends his model to include even "knowledge of the universe". As SFG linguists repeatedly manifest, the edges where semantics and syntax meet are rather fuzzy and hard to tackle.

If we consider what a SUBJECT means here:

(5a) This student cooks well.
(5b) This cabbage cooks well.

One has to apply a semantic criterial yardstick to differentiate between an "agentive subject" - S^{ag} - and an affected subject -S^{af}-, as Fawcett suggests (1980:182). His functional components are inspired in Halliday's metafunctions, only that he expands them to as many as eight -including *modality* and *polarity*- operating in two different ranks, since they represent the whole semantics of a language.

Above such a level we can only refer to the social context now studied under wide, loose areas of meaning known as *"register"* -field, tenor and mode- which reflect the link of a text grammar with the social reality (now mainstream theory), whereas for Fawcett such reality cannot be but a psychological one. The components are:

Ideational { experiential / logical
Interpersonal { interactional / expressive
Textual { thematic / informational

For a start, in sharp contrast with Hudson, he aims at a semantic description of language, thus mapping all the selected formal items and structures to these basic six functions: "It is important to emphasize that the meanings in the network are those that are built into the organization of the language".(Fawcett 1984:140)

4.1. So the items, structures and tone contours of a language play a part of some sort in the generation of specific meanings and only those, not other possible universal meanings. The configurations of networks, therefore, depend largely on the actual language concerned, since every semantic feature must have a reflex at the level of form. The way meanings are put to work within the abstract framework of the components is of a computational kind, that is, operating simultaneously on several strata.

In the mentioned paper Fawcett allows for the *cognitive reality* to be present at the entry condition to any network (cultural classification of things) since, for this author, communicating is basically a transference of some "concept" from one mind to another. He calls such a concept "referent-thing" which is itself part of a "referent-situation" and both are obviously mental constructs that, Fawcett arguably claims, constitute the *input* to the grammar in two ranks respectively.

As in Halliday's prior framework, he extends semantics to embrace the area traditionally assigned to pragmatics in the interpersonal component, which is only too natural in an SFG approach. Thus he would generate the utterance:

(6) Would you be quiet, please?

Instead of starting, as is customary, from the syntactic alternatives of the "mood system", he tries simultaneous choices from the *intonation* system and the *illocutionary act* system. Thus we get the following paths chosen:

Command→ Directive→Request (pleading)→Tone 1 3

This path differs, however, from that of Halliday's, who seems inclined to contemplate a "speech function" realized in a straightforward way -unmarkedly- by means of congruent lexicogrammatical structures. And, although non-congruent realizations like that of (6) are recognized, they are not sufficiently explained, considering the importance of the so called "indirect speech acts". So for Halliday (1985:69) the semantic networks which map fittingly the congruent realizations of the Mood system are:

Speech function	Commodity exchanged	goods & services information
	exchange role	giving demanding

This essential network has been extended and completed by others (Martin 1992) to the most delicate detail, thus building inside the semantics what is in other traditions left to the work of pragmatics.

Fawcett's model of illocutionary acts is, as usual, richer in complexity and elaboration, which means that it is less theoretically powerful in capturing generalizations. In effect he introduces as an enriching factor the role of tone groups as conveyors of meaning. But here we are already treading a ground hedged up by a discoursal level from which we want to keep away for the sake of simplicity, even if the said hedge is not so thick that it forbids interconnections.

The question of *depth* mentioned above is the heart of the whole matter of generation. It accounts for the tracing of the number of nodes from the terminal items at the bottom to the top of the trees. This assumption is also expressed through the notion of *cycle* in Matthiessen (1985).

One cycle is one complete move from the paradigmatic axis to the syntagmatic axis. In other words, it covers an arch starting with the *input system* and stretching out to the *output text fragment*.

According to Matthiessen, the features associated with a function are either grammatical (the operator is *Preselect*) or lexical (the operator is *Out-Classify*).

Thus he sees these conditions on entry like this:

PARADIGMATIC:

cycle n
↓
intercycle
(preselection)
↓
cycle n + 1

A realization is only stated once, given the binary character of features (either positive or negative). This is accomplished by means of the *gate*, which is also used by Matthiessen. This means that several parallel systems may share the entry condition of a feature (SUBJECT for instance for an existential/declarative /imperative type of predication). Thus a gate is an economical device which prevents unnecessary repetitions: "Given features m and n, insert F".

In sum, the type of multi-functional grammar Halliday first developed in the late 60s and elaborated by many linguists over the years enables us to see the complexity of the conflating three functions in a single constituent : transitivity, mood and theme, each itself subdivided into a number of sub-functions.

They give us a complex picture of language meaning potentials, which is quite near our intuitions of how a human language must work.

4.2. In conclusion, I am persuaded that a SFG is capable of generating the lexicogrammar of the language helped by the input systems and the sheltering macrofunctions. And, despite the still vague categories of such functions, they are, however, necessary to capture textual generalizations and orientations in human exchange of meanings.

Admittedly, there are many weak points awaiting further attention and development in SFG, but a grammar with such ambitious aims - describing, explaining and predicting human texts - surely deserves more sustained, joint efforts on the part of current analysts.

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