

## Genesis of Two Algebraic Theories of Language<sup>[\*]</sup>

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### 1. Introduction

**1.1** In the present paper, we present our view of how two algebraic theories of language, formulated and developed at about the same point in linguistic history, came into existence. The theories and their variants we have chosen to this end are, on the one hand, the standard theory of transformational grammar, formulated in the mid-1960's by Noam Chomsky, and, on the other hand, an early version of the functional generative description of language, formulated at about the same time by Petr Sgall as an alternative to Chomsky's transformational grammar. Should the reader question, or even think in vain, our honest pursuit of two theories to which the bell seems to have tolled long ago, we may not have any cogent arguments at hand to object. However, we bid him spare a while reading and eventually see for himself whether his initial doubts were justified. In this regard, we want to show that even though both algebraic theories of language, treated in greater detail below, might nowadays be considered out-of-date, a brief account of their genesis may help better understand, or recall, the theoretical background of their current variants. We are going to argue, among other things, that while the theory of transformational grammar is not always easy to trace back to the theoretical assumptions it openly declares, the theory of functional generative description usually makes careful provisions for both the *functional* and *generative* sources of its theoretical inspiration. In doing so, we will follow a single main aim: to reemphasise that both theories are, first and foremost, theoretical constructs combining in their peculiar ways a portion of linguistic data with a set of formal means by which the linguistic data is to be represented.

**1.2** Specifying the genesis of the standard theory of transformational grammar (TG) and of an early version of the functional generative description (FGD)<sup>1</sup>, we proceed from

outlining a range of the basic assumptions and aims within which both theories developed. We have the possibility to document that the traditions of theoretical bases and methodologies which TG and FGD have taken up are very different. This enables us to arrive at what might appear an unsurprising conclusion, namely that only TG can be considered a generativist linguistic theory *par excellence* within the Chomskyan tradition of generative grammar, whereas FGD represents a linguistic theory primarily reflecting assumptions of a non-generativist nature. At the same time, however, we will be able to gather that from a viewpoint of the generative procedure, which TG and FGD have applied as an algebraic method to language description, both theories represent two alternatives of a single theoretical approach. The main task of the present paper thus is to show that a relevant comparative basis of both linguistic conceptions is constituted by a general, algebraic-linguistic framework, which both TG and FGD enter with a set of their own linguistic and more-or-less common non-linguistic (mathematical and logical) assumptions. In this respect, we argue that the semantic content of the notion *generative*, appearing in the designations of both theories, is actually two-fold: transformational and functional, concluding that this notional variance is due to both a different origin of the linguistic assumptions on which TG and FGD rest and an alternative conception of some algebraic assumptions which TG and FGD share.

### 2. Assumptions and Aims of TG

Our study of the early works on transformational grammar brought us to believe that the theoretical assumptions and aims of TG may reasonably be divided into two groups: (a) *explicit* assumptions and (b) *implicit* assumptions. Theoretical assumptions of the former kind have been generally explicated in Chomsky's work and more or less identified with selected theses of an older, philosophy-based linguistic thinking, commonly referred to as *traditional grammar* (cf. Chomsky 1964a; 1965). On the other hand, theoretical assumptions of the latter kind have not been stated explicitly in Chomsky's work, but their influence can still be traced in TG. We maintain that these assumptions include some of the isolated theses and methods of American and European structuralism, regarded by Chomsky – paradoxically enough – as a linguistic legacy which must be rejected and labelled depreciatively as *taxonomic*.

#### 1.1 Theoretical Aims Reflecting the Explicit Assumptions

Simplifying a bit, we may claim that there were two major explicit, philosophico-linguistic assumptions of generative grammar (cf. Chomsky 1964a; 1965; 1966a; 1966b):

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<sup>1</sup> Unless provided otherwise, the abbreviations *TG* and *FGD* solely refer herein to the standard theory of transformational grammar and the early version of functional generative description of language, respectively.

- (a) the Rationalist thinking of René Descartes, exercising influence both directly through his own work (*The Discourse on Method* and *Meditations on First Philosophy*) and indirectly through the philosophical grammar of the Port-Royal abbey (chiefly represented by Lancelot's and Arnauld's *Grammaire générale et raisonnée* and Arnauld's and Nicole's *La logique, ou l'art de penser*) and through the thinking of other rationalists, such as Gottfried Wilhelm Leibniz (his *New Essays Concerning Human Understanding*);
- (b) the Romantic linguistics of Wilhelm von Humboldt, author of the first attempt at a philosophical turn toward language (his monograph *Über die Verschiedenheit des menschlichen Sprachbaues und ihren Einfluß auf die geistige Entwicklung des Menschengeschlechts*).

**2.1.1** TG shows a major Rationalist influence by emphasising, after the fashion of Descartes, that language is a logical entity in the first place. However, the major link between the generative description of language and traditional grammar has been established by Descartes' idea of language as a creative entity. It is commonly known that Chomsky sets the Rationalist idea of language creativity against a behaviourist postulate that language faculty is restricted to mere repetition of the previously realised and that it actually does not represent more than a set of grammatical habits or a complex of dispositions to verbal behaviour (cf. Chomsky, 1964a; 1966b). In the theory of TG, this is reflected by an attempt at describing language as a generative, rather than merely reproductive system. A generative nature of the language system is ensured by the presence of a generative component with recursive properties, included, at the linguistic level, in a syntactic component. In this component, Chomsky places formal tools of a context-sensitive phrase-structure grammar, containing context-free phrase-structure rules as well as context-free and context-sensitive subcategorisation rules, possessing certain transformational features<sup>2</sup>.

Another aim of TG is to formalise a fundamental Rationalist idea in the area of gnoseology. With regard to cognition, rationalists such as Descartes, Arnauld and Leibniz argued that people are born with a general system of ideas and truths which are activated and further differentiated in their minds as they are exposed to corresponding pieces of experience. Thus, experience is assigned a role of an activator of general mental faculties to which people are believed to be predisposed by nature. From among these faculties, Chomsky proceeded to select the one he referred to, following the terminology

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<sup>2</sup> These are not reflected only by the capacity of TG to generate recursive sentence structures but even by the fact that the lexical rule, included in the lexical subcomponent of the syntactic base, does not actually rewrite any of the symbols in the preterminal string but rather substitutes them (as an elementary substitution transformation) as a result of their structural identity with complex symbols included in the lexical entries.

of traditional European linguistics<sup>3</sup>, as a general faculty of language (*faculté de langage* – cf. Chomsky 1965, 56) and on which he based his language acquisition hypothesis. Following the original Rationalist idea, this hypothesis assumes that language is activated in the child's brain by corresponding stimuli from the external environment. Any such set of stimuli, referred to as *primary linguistic data* (cf. Chomsky 1964a, 26; 1965, 25), is then believed to represent an input sample of speech (*parole*) activating an output totality of the appropriate language system (*langue*) with which it is consistent.

Rationalist ideas in TG are further reflected by its tendency to regard any particular language as a system implementing certain features of universal language. In his conception of universal grammar, Chomsky was chiefly influenced by philosophical grammarians of the Port-Royal abbey, though his *universal grammar* and *grammaire générale* of Port-Royal cannot be fully identified. The difference is mainly in the scope of generality at which both grammars aim. Thus, on the one hand, the grammar of Port-Royal struggles for a traditionally inductive definition of the general properties of language, confining itself to a narrow range of languages considered prestigious in the eighteenth-century Western Europe (i.e. French, Ancient Greek, Hebrew, Italian, Spanish, English and German) and being generally incapable of leaving the traditional framework of language description subjected to grammatical categories of Latin. On the other hand, Chomsky's generative grammar strives for an inductive reconstruction of a universal grammar conceived as a functional principle of the general faculty of language (*faculté de langage*) and aiming at a specification of properties of all the existing, documented, as well as all the potential, as yet undocumented, languages (cf. 2.2.2).

By far the most significant finding of the Port-Royal grammar formalised within the theoretical framework of TG is a linguistic universal by which the Port-Royal grammarians have considerably contributed to the general theory of language. They have shown that the semantic structure of any sentence is determined by an abstract underlying structure consisting of elementary propositions among which a semantically superior (independent) *proposition principale* can be functionally distinguished from a semantically

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<sup>3</sup> The question remains whether Chomsky was ever aware that Ferdinand de Saussure, whom he initially dubbed father of modern linguistics and whose *lucidity* he would frequently emphasise (cf. Chomsky 1964a, 10), spoke about the faculty of language as an anthropologico-psychological prerequisite of language in the *Course in General Linguistics* and elsewhere (cf. De Mauro 1996b, 359). It should be added that de Saussure did not omit Chomsky's language creativity either, even though Chomsky was quick to reproach him so (cf. Chomsky 1964a, 23). As De Mauro 1996b, 424, rightly pointed, de Saussure considered both a creativity governed by the rules of language (reflected by analogy) and a creativity changing the rules of language (reflected by sound changes), this opposition roughly corresponding to Chomsky's notions *rule-governed creativity* and *rule-changing creativity* (cf. Chomsky 1964a, 22). Much unlike Noam Chomsky, however, Ferdinand de Saussure did not attribute language creativity to the system but rather to the faculty of language to emphasise that it is not inherent to grammars of individual languages but to a generally human mental faculty to master any such grammar (i.e. *faculté de langage*).

inferior (dependent) *proposition incidente* (cf. Arnauld&Lancelot 1676, 49-50). In this respect, they considered a sentence such as *Dieu invisible a créé le monde visible* a combination of three propositions: (1) *Dieu est invisible*, (2) *(Il) a créé le monde* and (3) *Le monde est visible*, of which the second represented the semantically superior, and the first and the third the semantically inferior, propositions (which they demonstrated by the possibility to reinterpret the original simple sentence as a complex structure *Dieu, qui est invisible, a créé le monde, qui est visible*). The theoretical assumption of an underlying proposition is reflected in TG by the notion of *deep structure* (cf. Chomsky 1964a, 10; 1965, 16; 1966b, 16, etc.), uniquely determining any generated sentence in terms of its meaning. In opposition to the deep structure, TG further introduces the notion of *surface structure* (cf. 2.2.2), uniquely determining any generated sentence in terms of its phonetic form (at the segmental level).

**2.1.2** As for the Romantic ideas of the German linguist, philosopher and diplomat Wilhelm von Humboldt, which have been an indisputable contribution to the general study of language, TG was mainly inspired by two of them: the conception of language as a creative power or process (cf. Humboldt 1836, 172-174) and the idea of inner language form (cf. *ibid.*, 210-217).

The first Humboldtian assumption resumed the original Cartesian idea of language creativity, further providing it with an inner feature of action. In the theory of TG, this is reflected by a corresponding aim at describing language as a generative procedure, rather than a set of already generated elements. The Cartesian notion of creativity and Humboldtian notion of process are further combined in a formal requirement of TG to describe language as an input-output device the internal structure of which allows defining a set of input and output elements. Such a device may be specified in at least two different ways: (a) as a descriptively adequate grammar of language of a particular language community, having spoken on written discourses interpreted by hearers of this community on the input and formally and functionally analogical discourses generated by speakers of this community on the output; (b) as a mental mechanism frequently referred to as *AD* (*Acquisition Device*, cf. Chomsky 1964a, 29; 1966b, 20-21), or *LAD* (*Language-Acquisition Device*, cf. Chomsky 1965, 52), having a body of discourses of a particular language community on the input and a descriptively adequate grammar, selected by speakers of the same community from among alternative grammars (consistent with the input body of texts but descriptively inadequate) by an adequate evaluation procedure, on the output.

As a result of the other Humboldtian assumption, Chomsky arrived at a notion of *general form of language* (cf. Chomsky 1966b, 10) which he came to consider an ultimate aim of his linguistic theory. Furthermore, he regarded the inner form of language, formulated by Humboldt in opposition to its outer form, as a proof that even Humboldt differentiated between an inner (deep) and outer (surface) structure of sentence (cf. Chomsky 1965, 198-199) and that he thus anticipated the existing opposition of the sur-

face and deep syntax. However, this conjecture of Chomsky was later subject to several criticisms (cf. Coseriu 1970).

## 2.2 Theoretical Aims Reflecting Implicit Assumptions

It should be quite obvious that in the history of linguistics, TG cannot be fully considered a theory directly continuing the philosophico-linguistic tradition of Rationalism and Romanticism. Despite several conclusions of Chomsky about the imperfections of modern, taxonomic linguistics, which might suggest and support such reasoning (cf. Chomsky 1964a; 1965; 1966b), one cannot omit that even Chomsky's linguistic approach was formed in a time and place heavily inspired with the teachings and methods of structuralism. Thus, even though Chomsky soon came to strive for a theory of generative grammar untouched by and devised in complete isolation from any structuralist ideas, these, as he has maintained ever since, being generally incapable of grasping the genuine, creative nature of language, it can be shown that in formulating this theory he has not been able to fully escape, or perhaps abstain from, several structuralist theses and methods. Based on their place of origin, the structuralist, or implicit, assumptions of TG may be subdivided into two groups:

- (a) assumptions of the American structuralism (descriptivism) and
- (b) assumptions of the European structuralism.

**2.2.1** For the sake of simplification, the approach of American structuralism to the study of language may be characterised by three major features (cf. Černý 1996, 200): (1) an emphasis on anthropology, (2) an overemphasis of linguistic expression (form) at the expense of linguistic content (function) and (3) a description of language with the use of mathematical methods. With regard to Chomsky's generative linguistics, we may assert, from a somewhat detached point of view, that it does not reflect the first feature at all and that it reflects the second feature to an extreme extent. In this respect, the description of linguistic form at the expense of linguistic function may be viewed not as representing a conscious methodological effort in Chomsky's algebraic theory of language but a direct result of the key, if exclusive, position of the third feature.

The descriptivists restricted their linguistic research to the study of text corpora, following a single aim: to construct a grammar of a particular language which would specify the units and relations ascertained in some corpus of texts composed in that language. In doing so, they arrived at two well-known elementary models of grammatical description: (1) the IP (*Item and Process*) model, one of the significant defendants of which was Edward Sapir; and (2) the IA (*Item and Arrangement*), adopted, among others, by Leonard Bloomfield, founder of the American descriptivism. It will indeed remain Chomsky's merit that after a long perseverance of the latter, static model IA (which may have been due to its apparently easier formalisation), he succeeded in formalising the former, dynamic model IP (cf. Černý 1996, 201).

Considering the descriptivist effort at constructing a grammar of any language on the basis of its respective corpus of texts unattainable, Chomsky imposed a much weaker requirement on his generative theory in the first step: to determine which grammar is more consistent with the language underlying a particular corpus, i.e. to focus on elaborating an *evaluation procedure* rather than a genuine *discovery procedure* (cf. Chomsky 1957, 49-52). The specification of appropriate criteria for defining the evaluation procedure then became the highest requirement on linguistic theory to which the generative grammar should proceed in the second stage (cf. Note below). In order to determine the extent in which finding such a procedure is actually possible within any linguistic theory, Chomsky introduced three levels of adequacy to identify three levels of successfulness of grammatical description (cf. Chomsky 1964a, 28-55; 1964b, 133-154): (1) adequacy of the lowest, *observational* level, attained by a linguistic theory whenever it interprets the observed corpus data correctly, i.e. when it is capable of distinguishing between relevant and irrelevant data; (2) adequacy of the medium, *descriptive* level, achieved by a linguistic description as long as it captures the linguistic intuition of native speakers of the language it describes and interprets the observed corpus data on the basis of *linguistically significant generalizations* (cf. Chomsky 1957; 1964a; 1965; 1966b; Chomsky&Halle 1968), expressing regularities of linguistic rules; and (3) adequacy of the highest, *explanatory* level, attained by a linguistic theory whenever it defines an evaluation procedure, selecting from a set of alternative grammars consistent with a particular linguistic corpus the one which is descriptively adequate.

The mathematical and chiefly logical approach of TG is chiefly reflected in the choice of elementary units of the transformational-generative description of language, defined as grammatical and well-formed sentences. The ability of native speakers of any language to generate and interpret an infinite number of such sentences is referred to as *competence* and generally conceived as a *system of rules*. The sum of these rules was then (i.e. before the concept of I-language was introduced) seen to establish a *grammar* of each language, with the set of all well-formed sentences constituting the *language generated by the grammar* (cf. Chomsky 1964a, 9). The resulting aim of any descriptive theory of language, then, is both to specify this set in an exhaustive manner and to assign as many formal objects, called *structural descriptions* (cf. Chomsky 1964a, 9; 1965, 89), to each element in this set as how many semantic interpretations it is seen to underlie (i.e. to assign  $x$  structural descriptions to any  $x$ -times ambiguous sentence). Chomsky defined the structural description as an abstract object uniquely determining the syntactic description, phonetic representation and semantic interpretation of the sentence to which it is assigned (cf. Chomsky 1966b, 13; Chomsky&Halle 1968, 7).

Some of the more conspicuous descriptivist assumptions of TG include the effort to formalise Edward Sapir's process model of syntactic description using Rulon Wells' immediate constituent analysis (cf. Chomsky 1957, 26-33; Wells 1947) rather than the dependency syntax widely spread in the methodological practice of classical philology since the 19<sup>th</sup> century. A significant impact on the formalisation of generative grammar

was further exercised by the transformational analysis devised by the leading representative of distributionalism and Chomsky's teacher Zellig S. Harris. Apparently, it was Harris' conception of transformation (cf. Harris 1951; 1957) that inspired Chomsky to introduce a sequence of transformational rules into the phrase-structure component in the earliest version of transformational grammar, despite the fact that both conceptions of grammatical transformation differed in form and principle: while Harris' notion of transformation referred to a special kind of structural relation holding between sentences of any particular language, Chomsky's transformation denoted a special kind of rule.

**2.2.2** It seems justified to argue that beside the American descriptivist legacy, Chomsky's theory of generative grammar drew on structuralist ideas even beyond the American continent. We will try to show below that such ideas may have included selected theses formulated by Ferdinand de Saussure in his outline of semiology on the verge of the 20<sup>th</sup> century as well as those of de Saussure's conclusions which were further elaborated by Louis Hjelmslev within the theoretical framework of glossematics in the 1940's.

In this connection, the Saussurean conception of language as a form should be mentioned first (cf. Saussure 1931, 140), which regards every single natural language as a means transforming an extralinguistic, amorphous mass of sounds and ideas into language-specific subsystems of units of sound and meaning. This assumption seems to have been met by the aim of TG to describe grammar as a device combining sounds (phonetic signals) with their respective meanings (semantic interpretations): *The grammar as a whole can thus be regarded as, ultimately, a device for pairing phonetically represented signals with semantic interpretations* (cf. Chomsky 1964a, 9; 1965; 1966b; 1972; Chomsky&Halle 1968). This theoretical aim of TG, which may be considered primary, is formalised by complementing the functionally independent syntactic component of a generative nature with two dependent components, phonological and semantic, of a merely interpretive nature.

This very general analogy of the sound-meaning relation actually rounds off Chomsky's inspiration with de Saussure's conclusions regarding the relation of sounds and ideas. On no account can Chomsky's analysis of sentence into a phonetic representation and semantic interpretation be identified with de Saussure's analysis of linguistic sign into *signifiant* and *signifié*. This is a plain consequence of the fact that sentences, representing the elementary units of TG, do not constitute genuine linguistic signs. Hence, although there may be nothing to prevent the internal relation of the phonetic and semantic component of any transformational-generative sentence from being construed as arbitrary, it is hard to see how the same relation could be assigned the external, differentiating relations. The reason, again, seems at hand: in contrast to the structural signs, the transformational-generative sentences do not establish a system, but rather an undifferentiated set without any semiotic value (cf. Saussure 1931, 141-145).

A no less significant inspiration of TG with de Saussure's semiology is the conception of language system (*langue*) as an abstract network of relations which becomes con-

crete and perceptible only through its manifestation, referred to as speech (*parole*). In Chomsky's linguistic theory, this distinction is reflected by the opposition of linguistic competence and performance. That the Chomskyan and Saussurean dichotomies are actually related is suggested by the fact that Chomsky directly mentions the *langue* vs. *parole* dichotomy in connection with the competence vs. performance distinction in one of his early works (cf. Chomsky 1964a, 10). On the other hand, not even this analogy is fully justified, the main reason being the above-mentioned non-semiotic nature of transformational-generative units. Another important difference between both dichotomies results from a strictly social character of *langue* and a more-or-less individual character of linguistic competence. This latter view implies that while de Saussure's notion of language system exists as a joint knowledge of speakers of a particular language community, Chomsky's competence refers to a language system acquired by an individual speaker, rather than a language community as a whole (cf. Černý 1996, 229).

Apart from the isolated features of the Saussurean conception, traces of another approach, taking up de Saussure's program of semiology, can also be identified in TG. It is a generally semiotic conception outlined by Louis Hjelmslev in his glossematic theory. Hjelmslev expanded on de Saussure's ideas concerning linguistic form in relation to extralinguistic substance, anchoring both notions in the fundamental entities of textual analysis, i.e. in the expression side and content side. He subsequently defined a form of expression and a form of content as entities arbitrarily forming their respective substance of expression and substance of content. Hjelmslev's conception of the expression-content relation may thus be considered another implicit assumption reflected by the effort of TG to formulate generative grammar as an (arbitrary) relation of the phonetic representation and semantic interpretation of any generated sentence.

In analogy to the Saussurean notions of *langue* and *parole*, Hjelmslev introduced the notions of *system*, or *language*, and *process*, or *text*, respectively, relating both hierarchies through a dependency (determination) function. Assuming that an invariable system (language) lies behind any variable process (text), he concluded that although the system (language) can be accessed through the process (text), the process (text) cannot be accessed through the system (language) (cf. Hjelmslev 1966, 43). Chomsky defines a similar aim by intending to study the underlying linguistic competence based on the immediately graspable performance. However, while Hjelmslev followed his aim by using an appropriate, strictly deductive method, Chomsky seems to have chosen a method which is rather inconsistent with his aim. Contrary to Hjelmslev, Chomsky refuses to study the ultimate body (corpus) of texts as a given fact (thus failing to use a genuine deductive procedure in Hjelmslev's terms), focusing instead on the formulation and mathematical formalisation of a mentalistic hypothesis about the internal structure of linguistic competence (or intuition). In this respect, he intends to utilise the body of texts merely to prove or disprove this hypothesis.

Finally, another possible glossematic inspiration may be attributed to the aim of TG to formulate each descriptively adequate grammar so that it generates all, hence even

new sentences of the language it describes, i.e. to establish a formal system capable of describing both the existent and as yet nonexistent sentences of the given language. The aim defined within Hjelmslev's glossematic program, then, is similar: to construct such a general theory of language in agreement with the requirement of arbitrariness<sup>4</sup> as would enable both to describe all the existing language systems and forecast all the potential systems, manifesting only virtual, rather than materially re-presented (realised) texts (cf. Hjelmslev 1966, 43-44).

### 2.3 Formal Aims Reflecting the Explicit and Implicit Assumptions

Based on the brief characteristics of TG aims, provided in Sections 2.1 and 2.2 above, we may now proceed to summarise the basic requirements on the transformational-generative theory of language. The grammar (= theory) of any language  $L$  is a special device – a set of rules –, ensuring full specification of an infinite set of grammatical sentences of the language  $L$  and of their structural descriptions. In order to specify the notion of *structural description*, the grammatical theory must contain the following (cf. Chomsky 1961, 165-166; 1965, 31; 1966b, 18):

- (i) a definition of the phonetically and semantically possible sentence, i.e. an enumeration of the class  $s_1, s_2, \dots, s_n$  of phonetically and semantically possible sentences;
- (ii) a definition of the possible structural description, i.e. an enumeration of the class  $SD_1, SD_2, \dots, SD_n$  of possible structural descriptions;
- (iii) a definition of the possible generative grammar, i.e. an enumeration of the class  $G_1, G_2, \dots, G_n$  of possible generative grammars;

<sup>4</sup> Chomsky 1957, 49, provides two criteria for evaluating grammatical descriptions, *generality* and *adequacy*, which he identifies with Hjelmslev's two basic requirements on the general form of theory, *arbitrariness* and *adequacy*, respectively (cf. Hjelmslev 1966, 17-19). Chomsky's and Hjelmslev's notions of adequacy are fairly close as they both require that a (linguistic) theory be formulated with a view to empirical data in order to qualify as empirically marked (or *realistic* in Hjelmslev's terminology). On the other hand, the analogy of Chomsky's notion of generality and Hjelmslev's notion of arbitrariness is bound to fail since the former notion does not meet a requirement of the latter notion, namely that a (linguistic) theory be quite independent on any empirical data in order to qualify as an empirically unmarked (or *arealistic* in Hjelmslev's terminology), purely deductive system. In this respect, one of the well-known consequences of Hjelmslev's arbitrariness is the fact that experience can only strengthen or weaken applicability of the theory, but not the theory as such. However, this is inconsistent with Chomsky's conception of linguistic theory as an empirical hypothesis, which is either proved or disproved depending on to what extent it reflects the nature of linguistic, and hence empirical data (cf. Chomsky 1966b). Therefore, rather than with Hjelmslev's arbitrariness, Chomsky's generality can be identified with a requirement laid on the nature of linguistic universals.

- (iv) a method for assigning possible structural descriptions to phonetically and semantically possible sentences, i.e. a definition of a function  $f$  such that  $SD_{f(i,j)}$  is a possible structural description assigned to a phonetically and semantically possible sentence  $s_i$  by a possible generative grammar  $G_j$ , for an arbitrary  $i$  and  $j$ ;
- (v) a method for evaluating alternatively formulated possible generative grammars, i.e. a definition of a function  $m$  such that  $m(i)$  is an integer assigned to a possible generative grammar  $G_i$  as its value (a higher number always indicating a lower value of the possible generative grammar);
- (vi) a definition of a function  $g$  such that  $g(i, n)$  specifies a finite-state automaton with phonetically and semantically possible sentences on its input and possible structural descriptions assigned to these sentences by a possible generative grammar  $G_i$  on its output – i.e. a specification of selected or all members of the function  $f(i, j)$ , where  $n$  is a variable determining capacity of the automaton.

In terms of linguistic description adequacy, features (i) – (iv) formalise requirements on a descriptively adequate linguistic theory and formalise assumptions of an explanatorily adequate linguistic theory. Feature (v) in turn formalises a requirement promoting any descriptively adequate theory of language to a theory which is explanatorily adequate. Feature (vi) promotes any theory of competence to a theory of performance since its fulfilment formalises an acceptable model of sentence generation and interpretation by any speaker and hearer, respectively, who have acquired grammar  $G_i$  and have a memory capacity expressed by the value  $n$ .

### 3. Assumptions and Aims of FGD

We have shown that the differentiation of the theoretical assumptions and aims of TG can be made dependent on whether or not Noam Chomsky explicitly identifies a source of linguistic tradition. The result of applying this criterion has been our subdivision of the transformational-generative aims into those which reflect either the explicated or implied assumptions. With regard to FGD, however, such an approach would be unjustified since Petr Sgall is usually very explicit about the assumptions which enter into, and about the aims he sets for, his linguistic theory. The genesis of FGD will thus have to be described with a view to different criteria.

The explicit reference to relevant sources of linguistic tradition has at least two apparent dimensions in the writings of Sgall's group: (1) a precise identification of the theoretical sources from which FGD directly or indirectly proceeds; (2) a precise identification of the theoretical sources which FGD modifies. It seems reasonable to suppose

that this opposition actually provides one of the feasible points of departure for the differentiation of the functional-generative assumptions and aims. Translating this differentiation into a general terminology of linguistic schools, we may reformulate the above opposition as that, on the one hand, of the inherently non-generativist theoretical and methodological approaches, which FGD chiefly (though not exclusively) assumes and further elaborates as appropriate, and, on the other hand, of the inherently generativist theoretical and methodological approaches, which FGD chiefly (though not exclusively) modifies. In this respect, the set of FGD aims may profitably be arranged so that it reflects either the non-generativist, or generativist assumptions. We thus arrive at one of the possible classifications accounting well for the designation of Sgall's theory as functional *and* generative.

#### 3.1 Theoretical Aims Reflecting Non-generativist Assumptions

The range of inherently non-generativist theoretical assumptions, within which the FGD aims were gradually formulated, is fairly wide and complex. It mainly includes a long tradition of the functional-structuralist approach of the Prague school as well as a tradition of the glossematic approach of the Copenhagen school, which were, as early as the 1930's, elaborating and applying to language research de Saussure's theory of linguistic sign. FGD further assumes ideas of several European and American linguists whose works appeared in the 1950's and 1960's. Of a somewhat different nature are the theoretical assumptions of stratificational linguistics, which developed in the United States in the mid-1960's. The non-generativist assumptions of FGD will thus be analysed below with regard to the following two lines of thought:

- (a) structuralist and
- (b) stratificational.

**3.1.1** As the first part of the name of the functional generative description of language suggests, the chief legacy of the non-generativist nature Sgall took into account while formulating his linguistic theory was the functional conception of the Prague school. From among the principles, characterising the functional approach of the Prague structuralism, the early version of FGD took up the teachings about the form and function of linguistic units, and to some extent even some conceptions concerning a multi-level organisation of the language system.

The Prague conception of linguistic form as phonetic expression and of linguistic function as meaning was close to de Saussure's conception of linguistic sign (cf. Sgall 1997, 65). Quite typical of the Prague school was a conscious and purposeful effort to make the elements of both form and meaning the objects of linguistic study. This had to do with the structural nature of the Prague approach, regarding any language as a system comprising units of form and meaning arranged in structural relations. Much like de Saussure assumed an inseparable link between both components of the linguistic sign,

admitting its separation only for the sake of scientific abstraction (cf. Saussure 1931, 140), the Prague linguists would urge the study of functions of the linguistic units with regard to their respective forms, and *vice versa*. In the area of grammar, this was particularly emphasised by Vladimír Skalička, who would frequently stress the inseparability of formal and functional aspects of the minimal units – *semes* – he defined for his grammatical description (cf. Skalička 1935, 11<sup>5</sup>). Skalička's influence on FGD is chiefly traceable in the notion of *seme* which Sgall introduced as an elementary unit of his morphemic description.

A typical feature of the Prague approach to the linguistic form and function was its perception of the relation between units of phonetic expression (forms) and meaning (functions) as graded, subdivided into a number of partial, transitional relations. A form-to-function relation was thus established between sounds and phonemes, (mor)phonological forms and morphemic functions of morphemes, morphemic and syntactic units or units of the formally syntactic structure of sentence (units of surface syntax) and units of the semantic structure of sentence (units of deep syntax). It was along these lines that Vilém Mathesius described a relation between the subject and agent (cf. Mathesius 1924, 284n; Mathesius 1961). Another Prague scholar, Bohumil Trnka, described the form-to-function relation in terms of the scholastic approach to linguistic sign (*aliquid stat pro aliquo*). In connection with his theory of linguistic levels (see below), he referred to the form-to-function nexus as a *realisation* or *implementation* relation, in which a signifying or realising form (*signifiant/réalisant*) at a lower level signified or realised (*stat pro*) a function signified or realised (*signifié/réalisé*) at a higher level (cf. Trnka 1990, 86, 143-144). Regarding this relation both as genuinely semiotic and logical, he fashioned it further with transitivity (if it is true that *A* bears a semiotic relation to *B* and if *B* bears the same relation to *C*, then it is true that *A* bears a semiotic relation to *C*) and asymmetry (if it is true that *A* bears a semiotic relation to *B*, then it is not true that *B* bears the same relation to *A*) (cf. Trnka 1990, 9).

The structural understanding of language as a system of signs in the linguistic conception of the Prague school was soon extended with a perception of language as a system of semiotic subsystems, or levels of linguistic description. In this respect, the graded relation of the form and function enabled the relations between the linguistic levels to be arranged systematically. Yet, no exact definition of linguistic level was ever provided by the Prague linguists, which was probably also the reason why they never agreed on an exact number of the levels either. For instance, Bohumil Trnka's conception rested on five levels: phonetic, phonological, morphological, syntactic (whose units included a sound, phoneme, word and sentence, respectively) and a *super-syntactic* (*ut-terential*) level where Trnka placed FSP phenomena in agreement with Mathesius (cf. Mathesius 1961) and whose unit he defined as an actual utterance of an actual speaker immediately reflecting an actual piece of extralinguistic reality. Trnka's levels were hi-

<sup>5</sup> This approach was further stressed by Mathesius 1936 reviewing Skalička's monograph.

erarchically arranged in a system and their units related by the above-described realisation relation. A linguistic analysis could thus conclude that syntagmatics of any lower level realised (or implemented) paradigmatics of any higher level, this applying both to paradigmatics of an immediately higher level and, by virtue of the logical transitivity, to paradigmatics of all higher levels (e.g. a string of phonemes realised not just a word, but also a sentence and an utterance<sup>6</sup>). Another feature with a significant impact on the theoretical aims of FGD was the fact that some linguists regarded the semantic structure of sentence as an independent linguistic level. Next to Vilém Mathesius, these included František Daneš a Miloš Dokulil in particular, who defined a semantic level of language as one of the two levels of sentence structure – semantic and grammatical.

The explicitly provided aims of FGD, reflecting the above functional-structuralist assumptions, may be summarised as follows:

- (1) FGD has been formulated as a semiotic theory of language.
- (2) The relation between *signifiant* and *signifié* is believed to be graded and thus regarded as a form-to-function relation. In the initial stage of FGD, Sgall referred to this relation as *semantic*, defining it informally as a relation between the phonetic form and meaning of linguistic units, subdivided into partial relations between the units found on adjacent levels (cf. Sgall 1967a, 40).
- (3) The system of language is believed to consist of several levels: phonetic (*PL*), morphonological (*MPL*), morphemic (*ML*)<sup>7</sup>, syntactic, or phenogrammatical (*PGL*), and semantic, or tectogrammatical (*TGL*).

A more detailed characteristic of the assumptions reflected by the second and third aims requires that other linguistic sources be identified. These include, on the one hand, some structuralist findings in the area of morphemics and syntacto-semantics and, on the other hand, the above-mentioned stratificational linguistics of Sydney M. Lamb.

The form-to-function relation in FGD is regarded as a *representation* relation, or a *type R relation* (cf. Sgall 1964, 96; 1967a, 40; Sgall *et al.* 1969, 17), which partially corresponds to Trnka's notion of realisation but chiefly coincides with terms which Charles F. Hockett applied to the description of relation between phonemes and morphemes (cf. Hockett 1961). Hockett assumed that the transition from the units on one level (from phonemes) to the units on an adjacent level (to morphemes) can be achieved mainly because beside the relations holding between both levels – representation, or the type *R*,

<sup>6</sup> On the other hand, Trnka's feature of asymmetry attributed to the semiotic relation implied that paradigmatics of a higher level could never realise (implement) syntagmatics of any lower level, i.e. that an utterance could never bear a semiotic relation to any sentence, word or phoneme.

<sup>7</sup> This level was originally designated as *morphological* by Sgall (cf. Sgall 1964; 1967) and was only later renamed to *morphemic*. This change was mainly to emphasise that the level in question included also lexical units (cf. the preface to Panevová *et al.* 1971, 15). The term *morphemic level* is contained already in Sgall *et al.* 1969, 26.

relations – another kind of relation exists between elementary units on the individual levels – compositional, or type *C*, relations. Sgall eventually adopted both terms, equally talking about *type C* and *type R* relations. As he began to study the representation (form-to-function) relations, he mainly focused on “super-morphemic” levels, which may have been related to a question of how many levels should actually be distinguished above the traditional level of morphemes (cf. Sgall 1967a, 48). Following the approach of traditional and modern linguistics (e.g. Lamb’s conception) and his own formal criterion for differentiating linguistic levels (a *condition on dissimilitude of contexts*, cf. Sgall 1967a, 53-55; Sgall *et al.* 1969, 32-34), Sgall came to distinguish two separate levels above the traditional morphemic level: a syntactic level (*PGL*) and a semantic level (*TGL*). Let us remark that later (since 1992) Sgall abandoned this distinction.

In the description of the syntactic structure of sentence Sgall takes up the tradition of dependency syntax, consistently applied to the description of Czech by Vladimír Šmilauer (cf. Šmilauer 1966). In his conception of syntactic dependency, Sgall further refers to Jerzy Kuryłowicz, who defined syntactic dependency as a relation between a head (the basic member) and a modifier (the second member) of a syntagm (group) in which the head is seen to represent the whole syntagm in its outer relations (cf. Kuryłowicz 1948). Following this definition, Sgall considers the predicate in any subject-predicate relation the head and the subject the modifier since it is the predicate that represents the whole relation both with regard to the modifiers (adverbials) and to other heads (matrix sentences) (cf. Sgall 1967a, 68; Sgall *et al.* 1969, 14). In regarding the predicate as the head of any predication syntagm, FGD was further inspired by the approach of Lucien Tesnière (cf. Tesnière 1959).

The description of the semantic structure of sentence in the theory of FGD is primarily based on a deep analysis of relations between two levels of sentence structure – grammatical and semantic – carried out by Dokulil and Daneš (cf. Dokulil&Daneš 1958). They established a relation between linguistic content, form and meaning, defining the notion of content as an extralinguistic structuring of the image of reality and the notion of meaning as a linguistic structuring of this image, reflecting content in linguistic forms. In the provided sense, Sgall does not define his tectogrammatical level as a level of sentence content but rather as a level of sentence meaning. However, he departs from the original conception of Dokulil and Daneš by a different classification of the actual units of meaning and content: in FGD, units such as agent, action or patient have been construed as units of meaning rather than of content (cf. Sgall 1967a, 40-41; Sgall *et al.* 1969, 14-15) and placed as a result on the *TGL*. It follows that the functional-generative semantics has aimed at the study of designation phenomena, the question of whether another level with denotative units should be postulated above the semantic level being left open by Sgall.

Towards the end of the 1960’s, Sgall’s team also began to study issues related to functional sentence perspective (cf. Sgall 1967b), generally conceived as a topic-focus articulation (TFA) in FGD and further elaborated during the 1970’s in the works of Eva

Hajičová (cf. Hajičová 1972; 1973, 1975). Much unlike the other Prague conceptions grasping or treating FSP phenomena (cf. the above-recalled approaches of Mathesius, Trnka or Daneš) in one way or another, linguists around Sgall have not traditionally placed the TFA tools on an independent level of language but on the existing level of sentence meaning – i.e. on the tectogrammatical<sup>8</sup> level.

**3.1.2** A major trace of Sydney M. Lamb’s stratificational theory in FGD is found in the multi-level arrangement of language. This is partially due to the plain fact that Lamb, much like Sgall, often used several features of Hjelmslev’s and Hockett’s approach to define basic linguistic relations. Thus, in agreement with Lamb, Sgall formulated FGD as a language description in which the form-meaning relation rests on a sequence of relations between the adjacent levels, or plans. These relations are defined in such a way as to enable continuous, uninterrupted transition from the level of sentence meaning onto the level of phonetic form, and *vice versa*. To this end, the stratificational theory was fashioned with a realisation dimension, describing a form-to-function relation of units on the adjacent levels, and a tactics dimension, describing syntactic rules for a correct formulation of units on each single level. Lamb’s realisation component may thus be regarded, from a linguistic point of view, as another assumption of Sgall’s representation relation and, from a formal point of view, as one of the assumptions of Sgall’s operation of translation (cf. 3.3), enabling transition from the superior generative level on any of the inferior transductive levels. Lamb’s tactic component may then be considered, again, from the linguistic viewpoint, another assumption of Sgall’s type *C* relation. Beside these theoretical resemblances there are even some empirical correspondences (e.g. use of dependency syntax).

The differences between both conceptions include the fact that in contrast to Sgall’s FGD, Lamb’s stratificational linguistics enables to leave a clearly defined area of linguistic meaning and move into a clearly defined area of linguistic content (cf. Sgall *et al.* 1986, 80). Furthermore, Sgall, unlike Lamb, did not insist on a strictly isomorphic structure of all the linguistic plans and admitted of a less symmetrical system of levels and units, thus considerably simplifying his description as opposed to Lamb’s. In this re-

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<sup>8</sup> Since Sgall has formulated his FGD as an algebraic theory of language, it necessarily reflects, apart from the purely linguistic assumptions, even some mathematical and formally logical assumptions of which we have taken scarce regard (with a sole exception of 3.2 below). However, Sgall’s frequent designation of the syntactic level as phenogrammatical and of the semantic level as tectogrammatical deserves a brief commentary. The terms *phenogrammatology* and *tectogrammatology* were devised by the mathematical logician H. B. Curry who used them in reference to the level of syntactic means and the level of syntactic structure, respectively (cf. Sgall 1967a, 33). With a view to these notions, Curry criticised Chomsky’s transformational grammar for failing to distinguish the syntactic structure of language proper from the means of its representation. Therefore, Sgall’s consistent use of both terms should also be perceived as one of the formal requirements on the theory of FGD.



spect, Sgall came to contrast the structure of the functional-generative levels of phonetics, morphonology and morphemics (*PL*, *MPL* and *ML*) with the structure of both functional-generative levels of sentence structure (*PGL* and *TGL*), arguing that contrary to the levels of the former kind the levels of the latter kind show certain features of logical calculi (cf. Sgall *et al.* 1969, 31). Also, Sgall intended to distinguish more levels than Lamb, which mainly resulted from another point at issue, concerning his and Lamb's views of what should be the nature of units defined on the individual levels (cf. Sgall 1967a, 49).

### 3.2 Theoretical Aims Reflecting Generativist Assumptions

The inherently generativist assumptions of FGD include some of the mathematical and formally logical assumptions formulated by Chomsky within the framework of algebraic theory of language. The formal aims of FGD, reflecting the transformational-generative assumptions of the algebraic nature, are nevertheless formulated either with certain deviations or in a completely different manner. This is in line with Petr Sgall's programmatic intention to formulate his linguistic theory as an alternative to TG (cf. Sgall *et al.* 1969, 2). In this sense, we may assert that Sgall has not applied the generative procedure to signal affinity with Chomsky's theory of transformational grammar, but rather to signal affinity with Chomsky's idea of explicitness in linguistics.

In agreement with Chomsky, Sgall views the competence of language speakers as a *black box* (cf. Chomsky's *LAD* in 2.1.2), the internal structure of which may be learned only indirectly, by studying linguistic material, or data, on its output (cf. Sgall *et al.*, 10). It follows that even FGD regards language as an *input-output device* (cf. Sgall 1967a, 8), thus sharing at least one formal aim with TG which reflects an intention to grasp language as a mechanism whose internal structure may be explicitly described. In terms of the traditional generativist assumptions, both linguistic theories chiefly correspond in conceiving this mechanism as a generative system with recursive properties (cf. 2.1.1; Sgall 1967a, 81; Sgall *et al.* 1969, 37). Furthermore, TG's and FGD's approaches to the definition of the generative system seem to agree in principle. As well as TG distinguishes a generative (syntactic) component, generating underlying syntactic structures of sentences, and two interpretive (phonological and semantic) components, assigning phonetic representations and semantic interpretations to these underlying structures, FGD defines a generative component, placed on the *TGL* and generating initial representations of sentence meaning, and transductive components, taking turns to translate the initial representations into representations on lower levels of the language system (*PGL*, *ML*, *MPL* and *PL*).

Apart from the two important generativist features which TG and FGD share, there are at least other two features in which they differ. One of them is to do with the fact that

while TG considers the syntactic<sup>9</sup> level as generative, FGD places the generative component on the traditional level of sentence meaning (*TGL*). The other difference is related to the formal treatment of the generative component itself: while TG regards this component as a context-sensitive grammar (cf. 2.1.1), FGD defines the same component as a grammar which is context-free<sup>10</sup>. Put in a more formal way, as opposed to context-free grammars and the systems with which they are equivalent, FGD has managed to upgrade its model of syntactic description by combining the context-free grammar with a sequence of pushdown transducers. In this, FGD resembles Lamb's stratificational linguistics (cf. 3.1.2) and deviates from TG, resolving the same problem by extending the context-free phrase-structure grammars with rules of another type, i.e. with context-sensitive rules (cf. Sgall 1967a, 49).

The view of language system as an input-output device with a generative basis is tightly connected with other two formal aims which FGD adopts as generativist assumptions (cf. 2.2.1):

- (1) to specify a formal set of (grammatical) sentences of the language described<sup>11</sup>;
- (2) to assign as many structural descriptions to any such formally specified sentence as how many times it is identified as ambiguous by native speakers of the language described (cf. Sgall *et al.* 1969, 1).

Following Chomsky, Sgall attempts the formal specification of both aims, using the methods and approaches elaborated in mathematics and formal logic to describe systems of different kinds (cf. Sgall 1967a, 8). Even in this case, however, the formal aims of the transformational-generative and functional-generative theories of language are not fully identical, showing certain deviations. One such difference reflects the aim of FGD to specify, at the given stage of formalisation, the grammatical as well as ungrammatical, though comprehensible sentences (cf. *ibid.*, 42-44). Although Sgall considered this feature a fallback of his theory, he also came to regard it as a source of empirical knowledge for studying different kinds of semantic deviance at the level of sentence, being fully

<sup>9</sup> Chomsky's notion of *syntax* can on no account be identified with the traditional sense of *syntactic* since beside the units of traditional syntax, it includes even the units from other traditional levels (phonological, morphonological, morphosyntactic and lexico-semantic).

<sup>10</sup> However, as Sgall 1967a, 20n, recalled, the opposition of formal labels *context-free grammar* and *context-sensitive grammar* should not imply that contextual restrictions are definable only in grammars of the latter type.

<sup>11</sup> Studying the assumptions of this formal aim, one cannot solely rely on the transformational-generative inspiration, for as Sgall 1967a, 9, has argued, the description of language as a specification of a set of well-formed sentences was in place already before Chomsky, in the logical description of formal languages.

aware, however, that the notion *comprehensible sentence* was still very vague (cf. Panevová *et al.* 1971, 20).

### 3.3 Formal Aims Reflecting Non-generativist and Generativist Assumptions

Following the brief characteristics of the FGD aims, provided in Sections 3.1 and 3.2, we may now proceed to specify the formal requirements on the functional-generative description of language (cf. Sgall *et al.* 1969, 9-10). In doing so, we can observe some correspondences with the formal approach of TG, the main principles of which were specified in 2.3 above. In this respect, we may conclude that while treating the inherently generativist assumptions to specify requirements on the generative system of FGD, Sgall strived for an alternative formalisation of the TG requirements (i), (ii), (iii), (iv) a (vi). Requirement (v), related to the hypothesis about the internal structure of linguistic competence (intuition), was disregarded by FGD.

Considering a semantic relation and both sets of sentence representations for which the relation is defined – the set of semantic representations and the set of phonetic representations of sentences (cf. features (i) a (ii) in 2.3 as possible equivalents) –, a translation procedure may be formulated which will assign to each element from the set of semantic representations at least one element from the set of phonetic representations so that:

- (i) the operation of translation, defined by this procedure, is a general mapping of the set of semantic representations into the set of phonetic representations of sentences;
- (ii) a representation  $r$  is mapped (translated) into a representation  $q$  only if  $r$  and  $q$  are representations of the same sentence ( $r$  and  $q$  being elements from the set of semantic representations and the set of phonetic representations of sentences, respectively);
- (iii) the whole procedure can be specified using pushdown and finite-state transducers (cf. feature (vi) of 2.3 as a possible alternative);
- (iv) the operation of translation may be subdivided into several subsequent steps so that the input language of the transducer performing the first step is identical with the set of semantic representations of sentences, the output language of the transducer performing the  $i^{\text{th}}$  step ( $1 \leq i \leq n - 1$ , where  $n$  is the number of steps) is a subset of the input language of the transducer performing the  $(i + 1)^{\text{th}}$  step and the output language of the transducer performing the  $n^{\text{th}}$  step contains a set of phonetic representations of sentences as a subset, each transducer translating

every representation of the given sentence into another representation of the same sentence (cf. feature (iv) of 2.3 as a possible alternative)<sup>12</sup>;

- (v) each of the transducers, specified under (iv) above, is mathematically – and thus even linguistically – interesting (cf. Chomsky 1961, 181n).

The above definitions are meant to imply that as long as any pair comprising an element from the set of semantic representations and one of its mappings into the set of phonetic representations of sentences is considered a case of semantic relation and the output (or input) language of one of the transducers, described under (iv) above, is regarded as a linguistic level, the semantic relation may be viewed, within the theoretical framework of FGD, as a sequence of relations each of which concerns two adjacent levels.

## 4. Conclusion: Transformational-generative vs. Functional-generative Approach

Once the theoretical assumptions and aims of TG and FGD have been described and their relations roughly established, the notion *generative* should now be better grasped and specified, in keeping with our statement provided in the introductory Section 1.2, in terms of its transformational and generative features. In this respect, it seems profitable to refer to Chomsky's theory of transformational grammar (= the generativist approach) and Sgall's theory of functional generative description of language as a transformational-generative and functional-generative approach to language, respectively<sup>13</sup>. Thus, following the observations made above, both theories are reducible to a common basis enabling, all despite the traditional classification of the generativist theory as an autonomous school of linguistic thought, to view the theoretical features of TG and FGD against a common, algebraic-linguistic background. To this end, we have arranged the theoretical aims of both approaches along two separate levels: (1) *linguistic*, defining the transformational-generative and functional-generative approaches as two different sources of linguistic thinking; and (2) *algebraic*, defining the transformational-generative and functional-generative approaches as two theories applying the same algebraic method, i.e. the generative procedure, to language description. This distinction is to reflect our major

<sup>12</sup> Sgall formulated even a stronger alternative, defining the output language of the  $i^{\text{th}}$  transducer as being identical with the input language of the  $(i + 1)^{\text{th}}$  transducer and the output language of the  $n^{\text{th}}$  transducer as being identical with a set of phonetic representations of sentences. However, FGD considered the weaker version presented here.

<sup>13</sup> In this sense, we regard the term *generativist* as standing in opposition to other linguistic schools and the term *transformational-generative approach* as primarily opposed to Sgall's functional generative description of language inasmuch both of these approaches represent two alternatives of algebraic linguistics.

aim, tacitly followed throughout this paper and pointed out in the introductory Section 1.1, to present TG and FGD as theoretical constructs combining in their peculiar ways a portion of linguistic data with a set of formal means by which the linguistic data is to be represented.

The correspondences and differences between the transformational-generative and functional-generative approaches to language, ascertained in the above sections of this paper in terms of their linguistic and algebraic levels, may be synoptically summarised as follows:

<b>1. Generative Approach to Language at the Linguistic Level</b>	
<i>Transformational:</i>	<i>Functional:</i>
<p>A. Distinguishes between an abstract language system as an intuition of native speakers (<i>competence</i>) and its manifestation (<i>performance</i>), primarily focusing on the description of <i>competence</i> (cf. 2.2.2); laying emphasis on the formulation of a hypothesis about the internal structure of linguistic intuition (cf. 2.1.2), it shows, apart from the features of an algebraic-linguistic theory, even some features of a <b>mentalistic</b> (i.e. psycholinguistic) theory.</p> <p>B. Describes the language system chiefly as a relation between phonetically represented signals and their semantic interpretations; such a relation assumes the properties of a <b>broadly syntactic level</b> mediating between a phonetic and semantic level of language (cf. 2.2.2).</p> <p>C. Distinguishes between a <b>semantic</b> (or <i>deep</i> in narrower sense) and <b>syntactic</b> (or <i>surface</i> in narrower sense)</p>	<p>A. Distinguishes between an abstract language system as a system of signs (<i>langue</i>) and its manifestation (<i>parole</i>), primarily focusing on the description of <i>langue</i> (cf. 3.1.1); laying emphasis on the semiotic nature (sign-character) of linguistic units, it shows, apart from the features of an algebraic-linguistic theory, most of the features of a <b>semi-otic</b> theory.</p> <p>B. Describes the language system chiefly as a gradual relation between a signifying component (<i>signifiant</i>) and signified component (<i>signifié</i>) of the linguistic sign; such a relation constitutes a system of <b>several linguistic levels</b>: <i>TGL</i>, <i>PGL</i>, <i>ML</i>, <i>MPL</i> and <i>PL</i>, on which and between which certain linguistic relations are defined (cf. 3.1.1).</p> <p>C. Distinguishes between a <b>semantic</b> (<i>tectogrammatical</i>) and <b>syntactic</b> (<i>phenogrammatical</i>) level of sen-</p>

<p>structure of sentence (cf. 2.1.2).</p> <p>D. Describes sentence syntax using the <b>immediate constituent analysis</b> (cf. 2.2.1).</p> <p>E. Does not distinguish syntactic structure of language (<b>function</b>) from the means of its representation (<b>form</b>) (cf. 2.2.1 and Note 8); furthermore, it fails to distinguish linguistic structure from the means of its representation.</p>	<p>tence representation (cf. 3.1.1).</p> <p>D. Describes sentence syntax using the means of <b>dependency syntax</b> (cf. 3.1.1, 3.1.2).</p> <p>E. Is consistent about distinguishing between a <b>function</b> and <b>form</b> of linguistic units: in the language system conceived as an organised set of several levels, the form-to-function relation establishes representation of units on the higher levels by units on the lower levels (cf. 3.1.1); furthermore, it distinguishes linguistic structure from the means of its representation.</p>
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<b>2. Generative Approach to Language at the Algebraic Level</b>	
<i>Transformational:</i>	<i>Functional:</i>
<p>A. Applies <b>mathematical and formally logical tools</b> to language description (cf. 2.2.1).</p> <p>B. Within the algebraic approach, it chooses the <b>generative procedure</b> to specify a set of all grammatical sentences of the language described (cf. 2.1.1 and 2.3).</p> <p>C. Assigns a <b>unique structural description</b> to every grammatical and unambiguous sentence specified by the generative procedure (cf. 2.2.1 and 2.3).</p>	<p>A. Applies <b>mathematical and formally logical tools</b> to language description (cf. 3.2).</p> <p>B. Within the algebraic approach, it chooses the <b>generative procedure</b> to specify a set of all grammatical, or comprehensible, sentences of the language described (cf. 3.2 and 3.3).</p> <p>C. Assigns, on each level of language description, a <b>unique representation</b> to every grammatical, or comprehensible, and unambiguous sentence specified by the generative procedure (cf. 2.2.1 and 2.3).</p>

<p>D. Conceives the generative system as an <b>input-output device</b> (cf. 2.3), consisting of a central <b>generative component</b> placed on the broadly syntactic level of language and of two <b>interpretive components</b> placed on the phonetic and semantic levels of language, respectively (cf. 2.1.1).</p>	<p>D. Conceives the generative system as an <b>input-output device</b> (cf. 3.3), consisting of a central <b>generative component</b> placed on the linguistic level of sentence meaning and several <b>transductive components</b> placed on the syntactic, morphemic, morphonological and phonetic levels of language, respectively (cf. 3.2).</p>
<p>E. Defines the generative component formally as a <b>context-sensitive</b> phrase-structure grammar (cf. 2.1.1).</p>	<p>E. Defines the generative component formally as a <b>context-free</b> phrase-structure grammar (cf. 3.2).</p>

It goes without saying that the above synopsis might be read and interpreted in a number of different ways, which would much depend on whether either one of the *transformational* or *functional* approaches, or rather their governing algebraic framework, were taken as a reference point. Our main intention was to present at least one interpretation of the way in which TG and FGD can be considered both similar and different theories of language. In this respect, we may now expand on two commonly accepted and well-established statements, recalled in the introductory paragraphs, namely that (i) only TG can be considered a genuine generativist theory of language (cf. Note 13) in the tradition of Chomskyan transformational-generative grammar and that (ii) FGD has been formulated as an alternative to TG. Using the above table, we may conclude that most of the resemblances are identified in the set of algebraic features and most of the differences in the set of linguistic features. It follows, then, that statement (i) asserts itself to the extent of four algebraic features (*2A*, *2B*, *2C*, *2D*) and a single linguistic feature (*1C*) and that statement (ii) holds to the extent of four linguistic features (*1A*, *1B*, *1D*, *1E*) and a single algebraic feature (*2E*).

Of particular significance for the theoretical makeup of both algebraic-linguistic approaches, however, is the linguistic feature *1B* and the algebraic feature *2D* by which the feature *1B* is formalised. It is the relation of these features that reveals a major intersection of one particular difference in the primary linguistic aims and one particular resemblance of the primary algebraic aims of TG and FGD. Thus, while both theories primarily aim at grasping the relation between units of phonetic form (sound) and meaning, it is FGD, but not TG, that eventually arrives at a genuinely linguistic description of this relation and its subsequent formalisation (disregarding for the present purpose certain formal imperfections admitted by Sgall, cf. 3.2). In TG, however, the situation is different, if reverse: although Chomsky succeeded in providing a formal description of the *sound-*

*meaning relation* (cf. Chomsky 1972, 66), or the *sound-meaning correspondence* (cf. Chomsky&Halle 1968, 3), he did not succeed in making his formal description reflect the inherently linguistic nature of the sound-meaning relation. Arguing that the transformational-generative relation of the units of form and meaning is hard to conceive as inherently linguistic, we maintain, and have attempted to show elsewhere, that it cannot be attributed a genuine semiotic value (cf. 2.2.2). Put in yet another way, the non-linguistic nature of the sound-meaning relation reveals itself in TG inasmuch as Chomsky fails to provide a linguistically viable alternative to the semiotic relation of form and meaning (indeed, supposing that such an alternative is viable at all), defined in the tradition of European structural linguistics. In any case, it should be kept in mind that our remarks presented in this paper concern older variants of the two theories, both of which have undergone rich development between the 1960's and the present time.

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