

HALF A CENTURY OF GENERATIVE LINGUISTICS – WHAT HAS THE PARADIGM GIVEN TO SOCIAL SCIENCE?

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Abstract. *This paper aims to join marking the fiftieth anniversary of generative linguistics by focusing on some principal contributions the field has given to science in general. In the first part of the paper, I discuss the issue of 'modern linguistics', as it is widely taught in local universities, and examine the importance of the generative school in this notion of modernity. In the second part, I analyze the fundamental conceptions and epistemological framework of this school in the study of language, pinpointing fifteen legacies it seems to have already left to human thought, as follows: breakup with behaviourism; reinstatement of the hypothetico-deductive method; elaboration of the mind-body issue; revival of the thesis that the only true reality is that of the human mind; reintroduction and extension of the term 'cognitive'; participation in rapid terminological changes in the social sciences; return to the problem of language universals with a strong focus on the genetic origins of language faculty; extended usage of the term 'grammar'; contribution to the deletion of clear boundaries between the natural and social sciences, especially in psychology; rise of reductionism in formal sciences; return to the once forgotten Gestalt principles of perception; radical breakup between lexical and sentence semantics; neo-Darwinism; rise of neuroscience; impetus to the foundation of new fields, often multidisciplinary ones. Reconciliation of cognitive and generative linguistics in the future is anticipated.*

Key Words: *modern linguistics, generative linguistics, cognitive linguistics, cognitive revolution, Chomskyan thought*

It has been exactly half a century since Chomsky's pivotal *Syntactic Structures* came out, a book that would initiate the revolutionary change in the history of linguistics. Fifty years of this groundbreaking approach have given linguistics a position that it had never had before - that of a leading discipline among the social sciences. However, the period has also seen decades of conflicts and resolutions, 'linguistics wars' and truces, disputes and reconciliations, in the numerous schools and subschools that have emerged since the late sixties. Whether a scholar supports or refutes the discipline, generative linguistics has

changed the world of language study. The goal of this text is to contribute to the 50th anniversary of the field by providing an overview of its position in the notion of 'modern linguistics', as it is taught in local universities, and by listing principal concepts the author believes generative linguistics has given to the world of the social sciences. Naturally, limited space provides room for no more but a short conceptual revision of this major shift in the Western thought – today still acclaimed, and widely regarded as 'the cognitive revolution'.

0. INTRODUCTION: MODERN LINGUISTICS?

The present moment finds linguistics in a rather chaotic condition. Both in the world and locally, approaches to the phenomenon of language are numerous, often fiercely opposed to one another, with their proponents sometimes personally at odds. In the short introduction that follows, I will discuss only the fundamental streams in the 20th century linguistics of the Anglo-American world, and mention their influence on the research in our country.

The very question "what is modern linguistics?" begs serious discussion, where consent is minimal. In some places, in our country in particular, it is still somewhat legitimate to treat as modern linguistics the traditional, prescriptive grammar, a discipline prescribing what kind of form or expression is suitable in the given situation, rather than describing forms actually used in the language. Globally, such endeavours are today considered prelinguistic, and are not welcome in contemporary language science, but it seems that even this oldest form of linguistic research still attracts attention of not so few scholars. Whether one should use 'Russian' or 'russian', 'deliverence' or 'deliverance', 'sweat' or 'perspire', 'gonna' or 'going to' – are some of the problems that regularly stir vivid discussions, among both laypersons and experts. And anything alive is by definition modern.

Historically, there seems to be general consent in our country that modern linguistics started with de Saussure in the early 20th century. Although the phenomenon of language had been studied from times immemorial, *Course in General Linguistics* (1916) is perhaps indeed the central book in the modern history of the discipline, which was only then granted the status of a mostly autochthonous scientific field. Saussure's theses of the dual nature of language, double articulation, language as an abstract system that should be described and not prescribed, and principled interest of linguistics in all languages of the world, paved the way to 20th century structuralism. Although many agree that structuralism and its follower in psychology – behaviourism – were ultimately defeated after Chomsky's criticism of Skinner's *Verbal Behavior* (1959), and, artistically perhaps more successfully, after Burgess/Kubrick's *A Clockwork Orange* (1962/1971), both structuralism and behaviourism are still alive: as endeavours responsible for much of today's terminology, general linguistic principles, or concepts that all later schools would accept, such as, for instance, the idea of *constituent*. Or, in clinical psychology, as therapies of choice that are still successfully used for treating neurosis. Structuralism and behaviourism are still widely discussed, in Serbian universities perhaps even today as central paradigms in the study of language. And that which is discussed is by definition modern.

For an average American student of linguistics, anything before Chomsky belongs to the pre-modern period. Breakup with structuralism and return to Cartesian cognitiv-

ism and rationalism¹, sketched in *Syntactic Structures* (1957) and completed (for the first time) in *Aspects of the Theory of Syntax* (1965) indeed represented a turning point in language research. The total focus of the language science on the human mind, definition of fully abstract formalized models whose purpose is to achieve the so-called *descriptive* and *explanatory* adequacy of the theory, but, it seems to the author, mainly the use of the classic method of natural sciences in language research – all these made generative linguistics a revolutionary discipline. Most importantly, Chomsky and his followers managed to secure a status for linguistics that the discipline had never had before: from *techne grammatike*, originally the skill of beautiful writing, over one of seven scholastic free disciplines, to Saussure, linguistics had often lived on the fringes of social research. With the advent of Chomsky, linguistics not only came much closer to principal human interests, but it also literally became the central discipline that would for the next half a century keep together fields such as cognitive science, cognitive psychology, artificial intelligence, philosophy of the mind, to name but a few. Such a new status of linguistics has aroused a lot of interest among researchers, sometimes followed by uncritical trust in anything coming from the generative school, which persists to the present day. Chomsky himself, now very close to his eightieth birthday, still writes. Models and approaches are changed and appended within the very generative theory, so today it becomes difficult to define this school as much more than a series of dozens of very diversified theories, related by the same fundamental epistemological framework. The conclusion is, however, that if something is alive in modern linguistics (at least in terms of the scope of activities and research), and thus modern, this has to be the generative school.

If the average American student considers Chomsky to be the father of linguistics, the dedicated American linguistics student believes Chomsky belongs to history, too. (From that point of view, structuralism is prehistory, and traditional linguistics is not really linguistics, but a kind of proto-scientific metaphysics). In the early seventies, a group of Chomsky's students, led by George Lakoff and a number of other talented young linguists (J. Ross, P. Postal, J. McCawley) expressed serious disagreement with the views of their mentor, creating a separate school that introduced an interpretation of meaning quite different from the one advocated by Chomsky. From the split into generative and interpretive semantics in the late sixties, over *Semantic Interpretation in Generative Grammar* (Jackendoff, 1972) to *Metaphors We Live by* (Lakoff and Johnson, 1980), generative linguistics was in a very turbulent period that ended in the rift into at least two major schools: *the school of cognitive linguistics*, led by Lakoff and still dominant in the west coast of the USA, and the so-called *MIT school*, dominant in the east coast.² Thus, this

¹ Chomsky (2003: 46-9) lists as models at least old Indian philosophers, Aristotle, Galileo, the French Port Royal school, Darwin, and the well-known mathematician and founding father of computers Alan Turing. In such a company, the conception of 'modern' obviously becomes rather elastic. But, this is probably so in any science.

² If Lakoff, Postal, Ross, and McCawley comprised the school of generative semantics, the opposing stream, that of interpretivists, was practically founded by Chomsky's student and, at the time, leading proponent, Ray Jackendoff. However, in his first major publication, mentioned above, Jackendoff introduced a specific understanding of the problem of meaning, which did give rise to the MIT school of formal semanticists and the so-called truth-conditional semantics, but it also provided some room for this author to later renounce the strong 'syntaxocentrism' of this school. It seems Jackendoff's view of meaning ('conceptual semantics': Jackendoff 1983; 1989; 2002) is today largely specific and typical only of him personally, but it might also be viewed as an attempt to reconcile two semantic schools based on the generative paradigm (see also: Antović, 2003: 421-3).

"Chomskyan"³ view of language became largely known as either "generative" or "cognitive" linguistics, but in the broader sense. In the narrower sense, cognitive linguistics today means the west coast school, while generative (sometimes only formal) linguistics pertains to the east coast.

Finally, more radical proponents of "new" generative linguistics consider as modern language science only the developments occurring after Chomsky's late breakup, this time with his own early theory and the schools of his former students. The period began with the *Government and Binding Theory* in the early eighties, continued in the *Principles and Parameters Approach* (Chomsky, 1986), and finally resulted in the *Minimalist Program* (Chomsky, 1995). The ultimate (at least in principle) simplification of the theory that was becoming overly complicated in its mutually contradicting revisions, insistence on the elegance and self-sustainability of principles, reminiscent of well-known postulates in science, such as Ockham's razor⁴, and finally the urge to reconcile the apparently contradictory models of descriptive and explanatory adequacy, have become the leading ideas of the minimalist program. This endeavour represents the current reality of the language science and, although still much disputed, undoubtedly stands at the core of modern Anglo-American linguistics.

Schools diverging from the mainstream Chomskyan approach, forming alternative paths, but still remaining in the generative realm, are too numerous to even list. Still, in this introduction I will mention two I believe deserve to be taken as alternative, yet promising approaches, sometimes taught at English Departments of Serbian universities, as well.

The European school in particular follows in its own footsteps. From the largely chaotic condition in the generative phonology of the late eighties, some time in the middle of the final decade of the last century, there emerged the so-called *Optimality Theory* (Prince and Smolensky, 1993). Itself praised and criticized, this school still persists as one of the dominant linguistic theories of the end of 20th century, and today there are attempts to use its principles outside the borders of modern linguistics, including visual and music perception. The research in optimality theory seems to be very much alive today, and thus also modern, especially in the areas in which linguistics borders on hardcore cognitive and computational science.

Once Chomsky's students, then his opponents, and ultimately researchers uninterested in his program, founded the school of *Cognitive Linguistics* in the early eighties – a movement usually scoffed at in the generative world (where its name is particularly disturbing: most generativists would first ask 'What is the meaning of *cognitive*?'⁵). The title and its legacy irrespective, this school's main contribution to linguistics lies in the study of meaning of individual concepts – a problem largely neglected in all generative streams. In particular, the study of the conceptual phenomenon of *metaphor* remains the most valued and acknowledged contribution that cognitive linguistics has given to the

³ The term Noam Chomsky himself rejects: "I don't like this personalization. That is a wrong way to think about things. There is no personalization in rational inquiry, everybody is working on it." (Chomsky, 2000: 40).

⁴ The principle in science claiming that the simplest solution based on the fewest assumptions is probably true, called that way after its originator, English Franciscan friar and philosopher William of Ockham (1285-1349). Interestingly, both behaviourist and later cognitivist schools, mutually conflicting, embrace Ockham's razor as one of their fundamental principles.

⁵ As did, for instance, prof. David Pesetsky of MIT, in our informal communication at the Conference on Language and Music as Cognitive Systems, University of Cambridge, 11-13 May 2007. For an attempt of clarification, see section 1 of this paper.

study of language (and, more broadly, thought). A former splinter group, it is fully detached from generative linguistics, but remains active and influential, especially in the west of the United States and some parts of Europe (France, Great Britain, Germany).

Fifty years after the birth of the movement, many other models are alive, too, and covered in local universities, whether fully or partly related to Chomskyan linguistics: lexicalism, functional theory, word grammar, tagmemics with discourse grammar, systemic grammar, stratification grammar, relational grammar, various eclectic approaches⁶. Acknowledging that each of these has its advantages and drawbacks, the author leaves them for other scholars to discuss as such diversity of the language science provides room for numerous research endeavours. One can only conclude that 'modern linguistics' can encompass as big a time frame as we would like it to have: it certainly is alive in the present day, and it can start from Panini, Aristotle, Augustine, Galileo, the Grimm brothers, Humboldt, Saussure, Bloomfield, Chomsky, Smolensky. The scholar is free to choose his or her framework, and why the options are so numerous can have two possible answers: pessimistic, that this is so because linguistics has still not solved any of its methodological problems; and optimistic, that this is so because linguistic problems are comprehensive and timeless, and have legitimately attracted the attention of thinkers for centuries.

Thus, in the study of language at least, modern seems to be that which we wish to consider modern. However, one cannot deny that *Syntactic Structures* marked the turning point in the language science fifty years ago, and that the school emerging from this little book has been the most influential around the world in the last twenty odd years. As such, it has not been given appropriate attention in the local circles, and the purpose of the rest of this text will be to show there are many reasons why this should be rectified. In the remaining part of this paper, I will shortly discuss the impact that fundamental conceptions of generative linguistics have had on other social sciences and even the worldview of everyman at the turn of the century. In other words, I will be interested in finding out what the Chomskyan paradigm, coming from a seemingly lesser important discipline, has given to the world of science in general.

1. MIND AND COGNITION – THE REVOLUTION

Chomsky's review of Skinner's *Verbal Behavior*, a text now nearly half a century old, is today considered the beginning of the "**cognitive revolution**". This is the first, perhaps crucial contribution generative linguistics (among other disciplines) has given to the social sciences and, more broadly, the philosophy of science. Indeed, the cognitive revolution represented a **radical breakup with behaviourism**: the stimulus/response routine with its notorious neglect of common-sense mental entities underlying behaviour, such as ideas, thoughts, or emotions. Instead, Chomsky introduced a neo-Descartesian approach: the idea that there are underlying, probably inborn, mental phenomena governing many human faculties, including knowledge of language. The new, cognitively-oriented scientist should postulate, formally elaborate, and (perhaps, but not necessarily) empirically prove the existence of these phenomena.

Not that behaviourists did not believe there were things such as ideas, thoughts, and emotions. They just wished to methodologically exclude them until such time in which

⁶ A good source providing a comparative overview of almost all grammatical theories in the cognitive paradigm in the last thirty years is Edmondson and Burquest (1998: 11-254).

science advanced so that the brain could be studied fully 'scientifically'. Otherwise, our intuitions of our own mental states would be little more than hardly provable convictions, for which the popular term today is 'folk psychology' (e.g. Churchland, 1984: 27, 43; Fletcher, 1995). The difference, therefore, is not that much in the intuitions and beliefs of a behaviourist and a cognitivist, but rather in their methodological preference. In the era of behaviourism, anything void of methodological rigour and strict empirical, usually inductive, confirmation was not considered fully scientific. With the cognitive shift, it became fully acceptable again to postulate hypotheses of unknown, underlying phenomena, test their plausibility in artificial, formal systems (hence the advance of formal logic and artificial intelligence), and, ultimately, if ever, check them empirically on the real human brain – i.e. subjects of flesh and blood. Therefore, the second major legacy of the fifty years of generative linguistics has been the **reinstitution of the hypothetico-deductive method** as a legitimate approach in modern (social) science. Indeed, without this conceptual shift, none of the disciplines of cognitive science, a leading research field in the world today, would really exist.

In linguistics, the shift also meant **total dedication to the notion that language exists in the mind only**. This was not so new at the time actually, as Saussurean linguistics also viewed language study mainly as a 'mind science'. Yet, the radical notion was the fact Chomsky openly defined generative linguistics as a branch of cognitive psychology.⁷ This means that in the generative paradigm one does not study language as an objective phenomenon existing in the real world (for instance, text), but rather as a set of mutually dependent entities in the human mind, i.e. brain.⁸ This classifies generative linguistics as a typical *mentalist* theory, because its subject matter is not objective reality (whose very existence is methodologically at stake), but **apparent reality, created in the mind of the individual using his or her native language**. The legacy of half a century of such an approach to mental phenomena has been all-present in the world of popular fiction and entertainment. Indeed, the idea that the only ultimate reality is that of the human mind has found thousands of iterations and reiterations in the decades behind us – with the *Matrix* trilogy as its recent and perhaps most successful dramatization. It would be fair to say that this entire worldview owes at least a bit to the early successes of generative linguistics. Naturally, the theory is also *cognitivist*, as it is interested in those mental phenomena pertaining to language which can be described through models of representation in the mind. The very term cognition once meant a set of only conscious abilities, mainly related to learning. Today it comprises a large number of computationally-based psychological phenomena, from the perception of simple stimuli to the construction of very

⁷ Also an emerging field at the time. This apparent 'demotion' of the status of linguistics paradoxically launched the discipline into the orbit: providing it for a while the central status in psychology. The view of linguistics as being a discipline of cognitive psychology is often quoted as the position of earlier Chomsky. Yet, this author could not find the exact wording in his original books. In later phases he considered linguistics part of "psychology, ultimately biology" (Chomsky, 1986: 27). His position irrespective, today one could rather claim that generative linguistics is one of the *cognitive sciences*, functioning in parallel with cognitive psychology, and not as its subsidiary branch.

⁸ **The revived discussion of the mind-body issue** is the third important legacy of fifty years of generative linguistics. Although the debate on the relationship between the mind and the brain is today considered largely solved in favour of materialists – proponents of the thesis that psychological processes are strongly physiologically based – the issue is not fully closed, after all. Numerous terms have been used for the organ in the history of generative linguistics, and today the safe compound *the mind/brain*, clearly functionalist in undertone, is considered standard.

complex representations. In the cognitive sciences, the term is taken in an even broader sense. Yet, even traditional psychological schools define at least memory, attention, perception, problem solving, and construction of representations as truly 'cognitive' processes. **The reintroduction and extension of the meaning of the term 'cognitive'** would be the fourth major contribution generative linguistics has given to the world of science. Yet, the terminological chaos that would soon emerge somehow diminished the clarity of the term, and thus also the importance of the fourth legacy as proposed here.

As it may be, the revolution was followed by a series of evolutions. Many schools have emerged in the past fifty years, usually retaining the principal ideas and framework of cognitivism, but in many other respects fully diverging from Chomsky and his followers. This has often led to terminological problems, since most schools have been either 'cognitive' or 'generative' in nature, but there has simply not been enough appropriate words to name them in a way which would succinctly explain how they are different from 'Orthodox' generative linguistics. In the most serious such clash to date, from the once unified generative linguistics of early Chomsky, in 1970s at least two major schools emerged, one of which retained the name generative, and the other called itself cognitive linguistics⁹. Today this presents us with a problem of the superordinate – a higher-order term that would encompass both (or all) groups of schools. Although generative linguistics is a chronologically older conception, I propose the phrase ***cognitive linguistics in the broader sense*** for the entire big field. This should be so, I believe, because human cognition is the principal research subject of the schools of Chomsky and followers (generativists), Lakoff and followers (cognitivists in the narrower sense), and also many 'maverick' approaches, the most distinguished of which is probably the conceptual theory of Ray Jackendoff. The fifth legacy of generative linguistics, starting from the very name of the field, is, unfortunately, **terminological chaos**: awkward as it might be, I believe the phrase *cognitive linguistics in the broader sense* is at least a way out for the name of the entire big domain. Fifty years of its reign deserve at least that much.

2. UNIVERSALS, GRAMMAR, AND FORMAL SYSTEMS

Through history of linguistics we find the rift between descriptions searching for differences and providing comparative overviews of individual languages, and schools dealing with Language – the universal human capacity for symbolic communication. Generative linguistics belongs to the latter group, and is thus a *universalist* theory, i.e. a theory pursuing *language universals*. As it claims that principled similarities can be found among all languages of the world, the generative theory holds that such similarities prove that there is a *strong genetic disposition for language* (which Chomsky calls *the innateness hypothesis*, e.g. Chomsky, 1962: 529). In other words, *linguistic competence*, the ability of the individual to correctly use his or her native language, is largely inborn and thus available to every healthy human being. This view is often termed *linguistic nativism*, a direct offshoot of the *rationalist* philosophy of mind. The sixth important legacy

⁹ Generative linguistics is still heavily influenced by Noam Chomsky. Cognitive linguistics is today usually associated with the names of George Lakoff and Ronald Langacker, and the school has been present as such since the early eighties. Paradoxically, and adding to the confusion of the reader from another field, cognitive linguistics originally emerged from generative semantics, a school opposing Chomsky's view of meaning, which does not exist under the label any more.

of generative linguistics is therefore **the return to the problem of language universals, with a strong focus on the genetic origins of language faculty**. The impact of this legacy is so strong today that one could claim it conceptually responsible for the supremacy of two leading research fields: genetics and cognitive science, whose small segments are often associated with problems of language.

Chomsky's claim of there being a largely innate capacity for language paved the way for the fundamental concept of the generative theory – *universal grammar*. The term "grammar" has been used in the same mentalistic epistemological framework: this is no longer a prescriptive discipline urging one to "correctly" use a form, but a descriptive-explanatory theory trying to predict and explain the way in which our mind manipulates linguistic structures. Universal grammar is the inborn capacity of the healthy individual to master his or her mother tongue and develop a full *linguistic intuition*. This intuition is different from the classical term in psychology, the ability to solve problems through direct insight. Linguistic intuition is merely unconscious knowledge of the mother tongue an individual possesses and manipulates without any visible effort. It is a direct consequence of universal grammar.

Universal grammar leaves room to create any grammatical structure in any world language. This room is filled up with a set of rules known as *linguistic principles*. After a certain period of human life, most authors believe by puberty, during the so-called *critical period of language acquisition* (Lenneberg, 1967) the ability to acquire all principles is lost, and only those relevant to the mother tongue of the individual remain. Specialized rules that exist in some languages, and not necessarily in others, which more precisely define the way in which principles are realized in the given language, are known as *linguistic parametres*. The principles and parametres theory (Chomsky, 1986: 75-84) also emerged nearly fifty years ago, with the first generative models, but it was first allowed key importance in mid eighties.

According to the principles and parametres theory, universal grammar does not need to fulfill all its principles in all individual languages. Therefore, it is typical of every language to have an inborn component, accorded with the principles, and an acquired component, manifested only in the concrete language picked up from the environment. The combination of universal grammar and acquired parametres makes up the *grammar of an individual language*, or *mental grammar* (after Jackendoff, 1994: 8 et passim). The complex interrelation between universal and mental grammar and its consequences for language acquisition remain important goals of generative linguistics. As it may be, **the extended usage of the term 'grammar'** remains the seventh legacy of generative linguistics. Rather than a mere set of rules for correct speech or writing, grammar is today a mentally-based, largely inborn capacity that governs our use of virtually any cognitive faculty: from language, over music, to vision.¹⁰

Apart from psychology, it seems that the generative theory owes a lot to natural sciences and mathematics. Its goal is to describe the *expressiveness* of language, i.e. our ability to use a finite set of rules and, a bit more substantial, but still finite set of lexical units to build a potentially infinite number of new (*novel*) sentences. Attempting to create a theory which would, ideally, allow even the most unintelligent imaginary computing

¹⁰ Again, Chomsky himself is somewhat skeptical of multidisciplinary enterprises and 'grammars' of all kinds of mental capacities. Still, in cognitive science the extended usage is today standard and the term is widely used.

device, such as the Turing machine¹¹, to create¹² all and only grammatical sentences of the given language, with minimal error coefficient, the generative theory uses many instruments available in first-order logic and mathematics. This means the theory is markedly *formal*, with sets of symbols and operations to manipulate them, which do not anyhow refer to the content of what is being said.

Apart from mathematics and logic, generative linguistics is methodologically close to theoretical endeavours in the natural sciences. It is accorded with fundamental empirical knowledge of the human brain, but in essence it still remains a speculative discipline based mainly on rationalist deduction. As such, the theory is constantly falsified in the Popperian sense of the word. As soon as a model turns out to be empirically incorrect, not fully adequate, or simply too complicated, it gives way to the next, more adequate one. Thus the theory is not really trying to fathom the "factual truth" about the human brain. Rather, it is striving to constantly improve its own methodology in order to get as close to this truth as rationally possible. Chomsky believes no natural science has gone further than this, so that even such an apparently modest goal cannot be taken as a drawback of the language science.

In more recent revisions of generative linguistics, authors have tried to reconcile *descriptive adequacy*, precise description of rules in individual languages, that tend to be very complex, and *explanatory adequacy*, the need for the mental system used by the child acquiring this set of rules to be ultimately simple¹³. This dualism is currently being investigated in the minimalist program, and, in Chomsky's own words, its methodology is closest to that of theoretical chemistry.¹⁴

Quite obviously from the paragraphs above, I suggest that the eighth major legacy of generative linguistics should be the **deletion of clear boundaries between the social and the natural sciences**. On this view, the social sciences are ultimately 'mind sciences'. As postulations, they first assume formal descriptions as in mathematics and logic, and then seek verification in psychology, ultimately biology. Formalists and functionalists stop here, as does Chomsky (1986: 27). Radical eliminative materialists, however, believe that ultimate facts, even in the social sciences, should be sought in physics (Churchland, 1984: 96-98). Whichever of the two stands one should take, it is quite clear now that the gap between the hard and soft sciences is becoming all but bridged.

3. DUALISMS AND CONSEQUENCES

The idea of language dualism has been with us for centuries. Its first clear definition probably came with the Port Royal school, and, with some clarifications, it became central to Saussure's teaching. Platonistically, Saussure made a distinction between language

¹¹ Alan Turing (1912-1954), English mathematician, logician, and philosopher. Famous for the Turing machine, a theoretical construct for data analysis on binary principles, which was used as the basis for the construction of the first computers.

¹² i.e. *to generate*, a technical term used identically as in mathematics, which eventually found its way to the name of the entire theory. In this context, *to generate* means to parse a system into new elements based on formal rules inherent to the system itself.

¹³ This problem was originally also defined rather early, see Chomsky (1972: 19-20).

¹⁴ Chomsky contends that linguistics should be thankful to logic, mathematics, and theoretical physics, but that its methodology is almost identical to that of theoretical chemistry. Once again, he quotes the papers of A. Turing, this time from chemistry and biology, fields not usually associated with this scientist (Chomsky, 2003:142-4).

as an abstract system delineated by natural, physiological, and psychological laws (*'language structure' - langue*) and a partly distorted concrete realization of this system, created in speech or writing (*'speech' - parole*). Chomsky accepted this distinction, translated it into his own cognitivist system, and defined it as the difference between the speaker/hearer's idealized knowledge of the language (*linguistic competence*) and his or her concrete usage of the language (*linguistic performance*) (Chomsky, 1965: 4).¹⁵ Labels for these two phenomena have often changed in previous decades, so that competence has often been called just *language faculty*, and performance *language production*. Instead of the terms competence or faculty, many theorists today use the phrase *language cognition*, obviously in a much narrower sense than the one I proposed above. It is important to notice that the distinction has mainly persisted throughout the development of generative grammar.

The postulated psychological distinction between competence and performance resulted in two apparently separated structures in the formal generative theory. Originally these were, of course, *deep structure*, representing the most abstract basic construct the speaker starts from in the discourse, and *surface structure*, a result of transformational procedures over the deep structure, representing that which the speaker/hearer actually pronounces or hears. During the development of the theory, the view of deep and surface structure has changed. Early on, Chomsky himself, dissatisfied with the common use of these two technical terms in too liberal a context in numerous social sciences, abridged the names of phrases to D- and S-structure, partly also changing the meaning of the symbols (Chomsky, 1981: 5 et passim). Lately, instead of deep structure, the common term has been *underlying*. More recent models, such as government and binding, detached surface structure from the output, and made this form abstract too, a kind of intermediary between the underlying structure and the final utterance. In minimalism, the conception of deep and surface structure has been abandoned, but it seems to still be implicitly with us, as after the operation *merge* there is still some room left for transformations. One of alternative approaches that I mentioned above, optimality theory, for instance, also renounces the distinction between deep and surface structure, and accepts only *input* and *output*. Still, these are also concealed constructs of underlying and surface forms, as they can be mutually significantly different under the influence of various *constraints*.

Regardless of any terminological inconsistencies, it seems that the distinction between deep and surface structure remains one of the most important features of the generative theory. It makes generative linguistics truly *reductionist*, as it shows that apparently complex structures can be significantly simplified in the formal system. Psychologically, during perception or production, this means that physical variables are constantly compared with the underlying abstract mental representation. And this further suggests that language is indeed a mental construct made up of hierarchically organized abstract structures, and not of a series of sounds existing in the outside world. Indeed, the idea of the psychological duality of language makes Chomskyan linguistics generative in the mathematical sense of the word. Therefore, the ninth relevant legacy of half a century of

¹⁵ Many authors stress that there is a crucial difference between Saussure's and Chomsky's dualist views of language, and that two conceptions cannot be compared so easily. For instance, Jackendoff (2002: 29) claims that both *langue* and *parole* correspond to the conception of language in society, which Chomsky labelled *external language* (E-language) in the eighties. Contrary to this, both competence and performance belong to the realm of *internal language* (I-language). It seems to me that this is not the most fortunate interpretation of Saussure, and that two conceptions are actually very similar (cf. esp. Saussure, 1916: 18-21).

generative linguistics would be **revived interest in language dualism, and the resulting rise of reductionist theories**, which persists to the present day.

This reductionism originally led to the introduction of a few principles that were very much unseen before the early sixties. The most well-known one is certainly that of *transformations*¹⁶, rules jumbling kernel sentences towards their ultimate, spoken realizations, subconsciously governed, yet possible to formally describe. Traditionally, transformations lead a sentence from its deep towards its surface structure, i.e. from its fundamental form, carrying meaning, devoid of any superfluous elements such as passive forms, inversions, or inflections, toward the utterance that is actually pronounced or heard. The status of transformations has changed significantly through the years. Early approaches tended to add a new transformation for every new phenomenon noticed, which often made the theory very bulky. Such linguists seemed to have forgotten the basic goal of the entire school, a simple and elegant theory of the mind. In the early seventies, generative semantics introduced transformations into the domain of meaning too, where complications at one moment threatened to disrupt the theory from within. Chomsky thus attempted to restore some order in terms of transformations, first by systematizing them and reducing their number, which resulted in his famous Pisa lectures, where the entire set of transformational rules was reduced to a simple principle today known as *transform α* (Chomsky, 1981: 18 et passim). Today, the minimalist model accepts a few fundamental transformations, so we can say they have remained one of the basic mechanisms of generative linguistics.

Transformations need to be governed by some *rules*. Early generative linguistics introduced *phrase structure rules* and rules related to the lexicon (*strict categorization* and *lexicon insertion* rules). More globally speaking, in traditional generative linguistics rules are binary (where the instruction will or will not execute, like in computers). With these, so-called *well-formedness rules*, there have been attempts at non-binary rules, not common in artificial intelligence, but apparently very much present in various forms of human perception, including understanding language structures. These rules originate from the early years of Gestalt psychology (e.g. Wertheimer, 1923). They were introduced into linguistics as *conversational implicatures* (Grice, 1975: 41-58), sets of patterns allowing the speaker/hearer to conduct a relative preference among a larger number of quite acceptable grammatical solutions. Jackendoff would later rename the principles as *preference rules* (Lerdahl and Jackendoff, 1983: 9 et passim). In the dissertation of J. Ross (1970:10), these were called *constraints*: the name would prevail in late government and binding theory and the minimalist program, while the concept would be brought to its extreme in optimality theory. In general, today it seems that generative grammar more and more renounces classical inflexible rules in favour of constraints. Hence, I suggest that renunciation of strict binary choices, and consequent **return to Gestalt principles of perception** is the eleventh important legacy of (more recent) generative theory. And a very important one, too: it is not so prominent in Chomsky's personal work, but is regularly found among his own supporters (government and binding, minimalism, optimality theory), opponents (Lakovian cognitive semantics [Lakoff and Johnson, 1999: 27-32], Fauconnier and Turner's blending theory [2002: 37, 45, 50 et passim]), and 'mavericks' (Jackendovian conceptual semantics [for instance Jackendoff, 2002: 40-57; 72-4]). In a

¹⁶ In earlier phases, the theory was known as *transformational-generative grammar* (TGG). This awkward label is today largely abandoned.

word, return to Gestalt principles, renamed as constraints or preference rules, might be a good venue in which the mutually conflicting approaches of cognitive linguistics in the broader sense could, perhaps, meet again – a resolution any impartial observer would only hope for.

Finally, each generative theory is heavily burdened by the problem of meaning. In accordance with the traditional approach to generativism, almost since the beginnings of the theory there has been the category known as *features*. Originally a derivation of probabilistic semantic models, following the seminal work of Fodor and Katz (1964), in early Chomsky features were viewed as the presence or absence of a property in lexical and grammatical units. Thus the noun DOG has the feature [+male], which can be both a semantic and grammatical category, while the noun BACHELOR has the feature [-married], which is obviously a purely semantic, even referential category¹⁷. Again, the verb WALK has the feature [-transitive], which must be labelled a fully grammatical category. Chomsky's early position (never fully rejected) is quite obviously untenable here: not only does he mix grammatical and semantic categories, but, more importantly, he fails to explain how come so elastic features are used in an otherwise strict formal theory (CLOWN would thus be [+male] [+funny]). The fact they come from our "experience", "knowledge of the world" and are thus in a kind of "semantic intuition" of the speaker/hearer helps little in justifying this simple introduction of features, whose number, by the way, can then be limitless. Naturally, lexical semantics did have to be explained somehow, and the generative theory did not seem to be a capable ground for explicating the meaning of individual words. At the time, the conflict with young proponents of generative semantics emerged, ending in the complete rift mentioned above. As it may be, to the present day Chomsky has retained the feature category. In the minimalist program, there are *head-, complement-, and specifier features*. They are much more abstract than they used to be, but still seem to suffer from the same flaws as in the standard model.

Contrary to the meaning of individual words, which the generative theory cannot fully explain, and thus skips it in most leading models, the meaning of the sentence, logical form stemming from generative syntactic analysis, has been very well described since the seventies. Along with the well-accepted rules of set theory and formal logic, conducted in formal semantics according to strict Fregean principles (e.g. Frege, 1884) and the modified first-order predicate calculus, a very important role in studying the meaning of sentence structures was played by the *thematic role theory*, as developed by Fillmore (1968) and Jackendoff (1972: 29-46). According to this theory, every expression contains an argument and predicate, taken in the broadly logical, rather than just grammatical, sense. Arguments in the proposition by definition carry one of the thematic roles, known in the theory as *θ roles*, such as agent, patient, theme, recipient, owner, goal, instrument, etc. Theta theory has been a very important supplementary device in the generative theory and remained one of the cornerstones of Chomskyan semantics. Still, one must conclude, and add as the legacy number twelve, that **insufficient credibility of formal sentence semantics, with simultaneous renunciation of lexical semantics and referentiality**, remain probably the most questionable results of the fifty years of the study of meaning in generative grammar.

¹⁷ Chomsky resolutely rejects referential semantics, a position many supporters of generative linguistics, especially philosophers of language, find unacceptable (e.g. Ludlow, 1996: xiv-xv).

4. EVOLUTIONISM, COMMUNICATION, AND MODULARITY

Generative linguistics has had strong impact on many other research fields. First it reintroduced rationalist epistemology proving, and this is today undisputed, that there is a strong genetic disposition for language: at least in terms of linguistic competence, man is no longer considered a blank slate. On the other hand, generative linguistics has influenced new thought on the origins of man and purpose of the symbolic system so finely tuned in humans. Most theoreticians are today strongly on the *evolutionary* standpoint, where they claim language is an extension of the general cognitive capacity, which is in turn an extension of the sheer ability to physically survive. Most also believe that the crucial language function is *communicative*, where, even though instrumental, interpersonal, ideational, aesthetic, and many other language functions do have some importance, communication, in the fundamental sense of 'transferring information', remains the key evolutionary step that language has bestowed on the human species. The thirteenth legacy of generative linguistics and the cognitive revolution is, thus, **a return to Darwinism**, which today assumes some very radical forms. A much acclaimed such field is that of *evolutionary psychology*, with authors such as Richard Dawkins (esp. 1978) and Steven Pinker (esp. 2002) as the most prominent advocates. Even more radical, yet much less accepted in scientific circles, is the field of *memetics*, loosely based on an idea from Dawkins' *The Selfish Gene*, whose defenders vouch for a *universal Darwinism*, in short, a possibility that not only the transmission of genes, but virtually any form of human behaviour is strongly based on imitation. One must mention, however, that the Darwinian position is dominant in Chomsky's students, and in students of his students (Lakoff, Jackendoff, Pinker, Plotkin, Sperber, see for instance Pinker and Jackendoff, 2005: 223-231). Chomsky himself, just like the second leading authority in philosophical psychology, Jerry Fodor, although praising Darwin, strongly opposes the idea that language is a result of natural selection. There has simply not been enough time for this, Chomsky exclaims, adding that language as we know it today existed in a pretty similar form thousands of years ago (Chomsky, 2003: 77-80). In this domain, Chomsky remains conspicuously alone, as he does in his thesis that communication is not really the purpose of the mental apparatus dedicated to language. Communication is a mere side effect of our highly organized society. The function of language is fully internal – to accommodate to the work of the mind/brain.

Mentioning J. Fodor, also an opponent of the evolutionary perspective on language, urges one to shortly discuss the *modularity* thesis (Fodor, 1983: 47-101), which indeed gave birth to cognitive science as a separate discipline in the late seventies. Cognitive ability is not linear and equal for all mental functions. On the contrary, there seems to be a general capacity (*central format*, after Jackendoff, 1992: 3) and a series of more or less specialized *modules*, responsible for specific domains, psychologically partly independent, and thus located in relatively separate areas of the cortex.

The notions in question are very abstract and the approach fully speculative, so that the status of the modular theory remains unclear today. The original idea was that of quite separate modules for the linguistic and visual capacities (Fodor, 1983: 48 et passim), perhaps also for the musical and "social" faculties (Jackendoff 1992: 125-157; 69-83), and maybe even the entire range of other abilities (intuitive mechanics and biology, conceptualization of food, understanding numbers, mental mapping of territories, selection of the habitat – Pinker, 1994: 420 et passim). This sounded ideal in the context of Chom-

sky's thesis of total specificity of language, supported by many empirical facts, such as, for instance, grammar loss in aphasia or the critical period of language acquisition. However, more recent studies suggest a different perspective. For example, Patel et al. (1998) were among the first to demonstrate that the musical and linguistic ability share some of the modules, in particular during temporal cognition of syntactic information – a tendency verified in a number of studies recently. Similar zones of the cortex were activated, which induced a similar psychological reaction of parsers, and this in turn enabled that some aspects of musical and linguistic cognition be expressed by similar formal-symbolical frameworks (once Generative Theory of Tonal Music, today also Optimality Theory). This study, among many others, suggests that the modular theory should be either thoroughly revised or fully rejected. If the former is the case, modules are still there, but they are responsible for much more abstract faculties, often shared by our externally-defined constructs such as music, language, visual perception... They seem to be organized more obscurely, though, such as modules for tonal perception, metaphorical representations, temporal processing, etc. Yet, if the latter is the case, all cognition is a consequence of a very complex network of inherently simple individual mental processors, which is a form of *holistic* view of the brain today revived in the so-called *connectionism* of more recent cognitive science. In generative grammar, it seems that minimalism still generally supports the modular view of the mind, while alternative approaches, such as optimality theory, are much more interesting to connectionists. As it may be, the **advent of new theories in neuroscience, with the modular and connectionist views of the brain currently at odds**, seems to be our fourteenth major legacy of Chomskyan linguistics.

I assume that even this short overview of the fundamental principles of generative linguistics is enough to show how influential the approach has been in the last fifty years. Its influence on the language science is huge, so important that one could confidently claim it is the dominant paradigm in modern linguistics. On the other hand, its impact on other domains of science, from music theory to brain research is equally important. The fifteenth legacy of generative linguistics, and the one I conclude this paper with, is thus its **impetus to the foundation of new disciplines**, subsidiary branches of the study of language, interdisciplinary fields studying language and other cognitive capacities, or fields fully separated from the language science: such as psycholinguistics, neurolinguistics, computational linguistics, musicolinguistics, Gestalt linguistics, and numerous others. Such a profound interest and prolific output is something only big and influential paradigms, 'scientific revolutions' in the Kuhnian sense, can boast. In 2007, half a century after the publishing of *Syntactic Structures*, one can assert that generative linguistics has been one of the most important speculative paradigms in more recent human history. Noam Chomsky and the first two generations of his followers have made expectations very high. Let us only hope that younger linguists will be up to the task. In that respect, I believe the key concern of younger linguists in the near future should be an attempt of a reconciliation of cognitive and generative linguistics. Maybe the centennial celebration will mark a family reunion.

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POLA VEKA GENERATIVNE LINGVISTIKE – ŠTA JE OVA PARADIGMA DALA DRUŠTVENIM NAUKAMA?

Mihailo Antović

Cilj ovoga rada je da ponudi mali prilog obeležavanju pedesete godišnjice generativne lingvistike tako što će razmotriti neke glavne doprinose koje je ova disciplina dala nauči uopšte. U prvom delu rada izlažem problem «moderne lingvistike», onako kako se ona uglavnom predaje na domaćim univerzitetima i istražujem značaj generativne škole u ovakvom viđenju modernog. U drugom delu, analiziram fundamentalne koncepte i epistemološki okvir ovog pravca u izučavanju jezika, gde izdvajam petnaest zaveštanja koja je generativna lingvistika izgleda već ostavila ljudskoj misli, a to su: raskid sa bihevizmom; ponovno uvođenje hipotetičko-deduktivnog metoda; dalja razrada problema odnosa duha i tela; oživljavanje teze da je jedina prava realnost ona u ljudskome umu; ponovno uvođenje i proširenje značenja termina «kognitivno»; učešće u rapidnim terminološkim promenama koje prate sve društvene nauke; povratak problemu jezičkih univerzalija sa posebnim naglaskom na genetsko poreklo jezičke sposobnosti; proširena upotreba termina «gramatika»; doprinos brisanju jasnih granica između prirodnih i društvenih nauka, naročito u psihologiji; uspon redukcionizma u formalnim naukama; povratak nekad zaboravljenim geštalt principima percepcije; radikalni razlaz semantike reči i rečenice; neo-Darvinizam; uspon neuronauka; podsticaj zasnivanju novih disciplina, naročito multidisciplinarnih. Rad predviđa i pomirenje kognitivne i generativne lingvistike u budućnosti.

Ključne reči: *moderna lingvistika; generativna lingvistika; kognitivna lingvistika; kognitivna revolucija; čomskijanska misao*