Noam Chomsky and Language Descriptions

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Noam Chomsky and Language Descriptions
Edited by John Ole Askedal, Ian Roberts and Tomonori Matsushita

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To Noam Chomsky

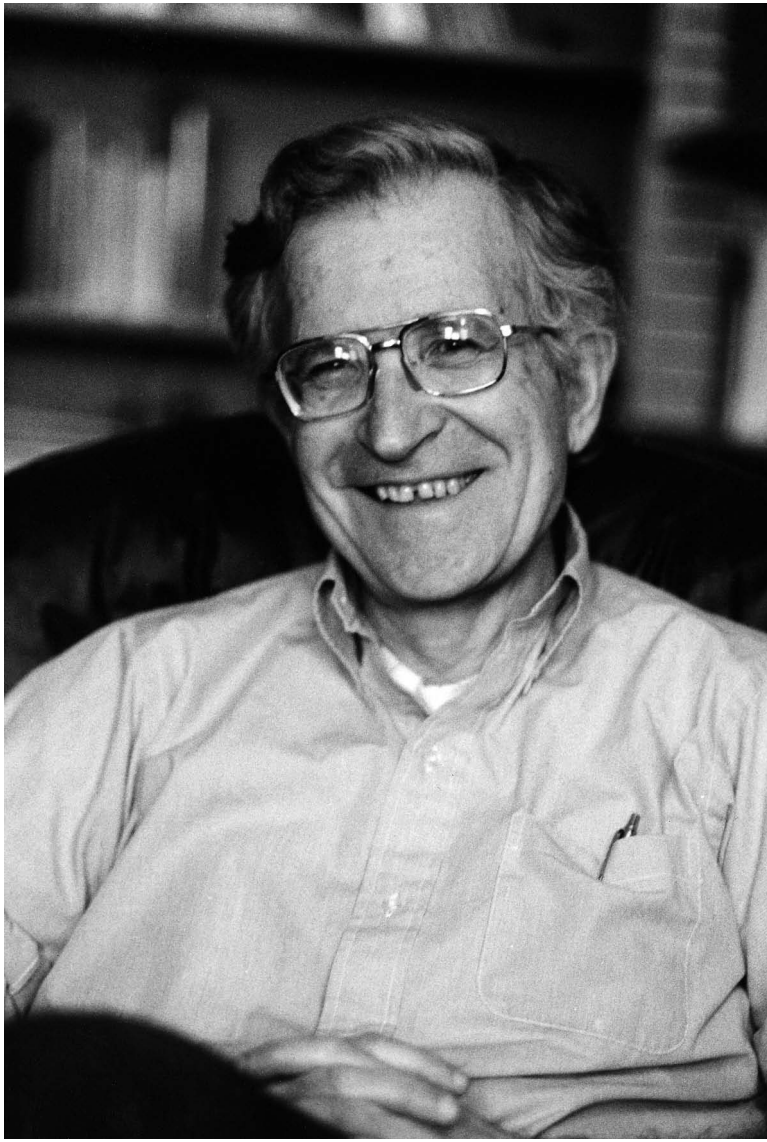

Table of Contents

PREFACE

Ian ROBERTS, John Ole ASKEDAL and Tomonori MATSUSHITA

GENESIS OF GENERATIVE GRAMMAR

Noam Chomsky was born in Philadelphia, Pa., on Dec. 7, 1928. He attended the University of Pennsylvania, where he met the eminent linguist Zellig Harris and where he took his B. A. (1949), M. A. (1951), and Ph.D. (1955) degrees. He was Junior Fellow at Harvard in the early 1950s, and began working on generative grammar at this period. He began teaching at the Massachusetts Institute of Technology in 1955, and is now Institute Professor there.

Chomsky is best known for the theory of generative grammar. Originally put forward in the 1950s (in Chomsky's PhD dissertation *The Logical Structure of Linguistic Theory*, 1955, published in 1975, and *Syntactic Structures*, Mouton, 1957), the central idea in generative grammar is that the nature of natural-language syntax can be captured by a finite set of rules which are able to produce an infinite set of well-formed structures. This idea, which was given full formal expression in a rigorous algebraic notation from Chomsky's earliest work, is now assumed by the majority of linguists, and has been highly influential in related fields such as philosophy, psychology and computer science. Many linguists feel that generative grammar has provided a true insight into the nature of human language, and thus into the workings of the human mind.

Like many advances in human knowledge, generative grammar arose from a synthesis of earlier lines of thought. Arguably, Chomsky's ideas can be best understood as a combination of American structuralist techniques in linguistics, the formal mechanisms of recursive-function theory, and Cartesian rationalism. Chomsky was trained as a linguist in 1940s America, in the heyday of post-Bloomfieldian structuralism. Indeed, his principal teacher, Zellig Harris, was a major practitioner of this approach. The key idea behind structuralism, in particular American structuralism, was the autonomy of linguistic structures: linguistic structures were looked at independently of psychology, of logic, even of meaning, and each "linguistic level" (phonemics, morphemics, syntax, etc.) was seen as independent of all others. This approach arguably led to greater rigour in analysis than had previously achieved and certainly freed linguistic analysis from certain aprioristic shackles. However, despite the best efforts of some, notably

Harris, the nature of syntax in particular remained difficult to understand. Chomsky saw that what was needed to understand syntax was a recursive rule system, or system of rule systems, which specified precisely how symbols could be combined and recombined in a limited number of ways to form the infinity of well-formed expressions of any natural language. The techniques of recursive-function theory, as it had been developed in mathematics largely in the interwar years, were adopted to this effect. In this way the key property of natural-language syntax, discrete infinity, could be formally captured for the first time (arguably this feature of language had been glimpsed by earlier thinkers, notably the 17th-century French Port Royal grammarians, but they had been unable to provide formal expression of their insights). Combining recursive rule systems with structuralist analytical rigour was already a huge step forward in our understanding of language, but Chomsky has furthermore argued that such rule systems must, at some level of abstraction from physical mechanisms, be instantiated in the human brain and determined by the human genome: thus the insight of discrete infinity becomes a biological fact about our species. We are only beginning to see the full consequences of this last idea now.

Very largely thanks to Chomsky's innovations in the 1950s, over the past fifty years linguists have arrived at a deeper understanding of syntax than had ever before been achieved. Chomsky also greatly enhanced the formal rigour of linguistics by providing an algebra for rule systems (this has had a major impact in computer science – see below). Moreover, Chomsky, by his advocacy of a rationalist view of mind and language, has firmly situated linguistic theory in relation to the cognitive sciences and philosophical questions more generally. It should also not be forgotten that Chomsky has contributed to the other areas of linguistics, most notably phonology in his monumental work, co-authored with Morris Halle, *The Sound Pattern of English* (Holt, 1968): this book redefined the subdisciplines of phonology and morphology entirely, and remains hugely influential. Chomsky has also written numerous works on the philosophy of language, and one monograph on the history of linguistics (*Cartesian Linguistics*, 1966; 3rd edition reissued by Cambridge University Press, 2009).

Outside linguistics, Chomsky's ideas have influenced other fields. Let us look first at psychology. It is sometimes stated that the "cognitive revolution" in psychology, the idea that behaviourist approaches were unrevealing and that human cognition could be studied on the basis of the computer metaphor of the mind, really began in 1957 with the publication of *Syntactic Structures*. Certainly the Chomskyan approach to language, in particular the idea that a central aspect of language is the manipulation of symbolic representations, is highly congenial to the cognitive-science view

of the mind in general. Chomsky's thinking has thus been highly influential in cognitive psychology.

Another major contribution to psychology was Chomsky's 1959 review of Skinner's *Verbal Behavior*. In that work, Skinner attempts to provide an account of first-language acquisition based on behaviourist stimulus-response theory. Chomsky demonstrates that this simply cannot work, and in so doing played a role in the downfall of behaviourism.

A third contribution to psychology is the emphasis in Chomsky's theorising on the importance of children's acquisition of their mother tongue. Chomsky, in his celebrated "poverty-of-the-stimulus" argument, has emphasised the difficulty of the language-acquisition task, and the fact that children seem to have the capacity to acquire the grammar of their native language on the basis of highly limited and deficient evidence. He points out that these observations are consistent with the postulation of an innate predisposition to language, or more precisely to the acquisition of grammars of a particular form, while they remain very difficult to understand if we assume that the sole basis of knowledge is sensory data. These ideas virtually created the discipline of developmental psycholinguistics, the study of the linguistic competence of small children. Over the past forty years, our understanding of the linguistic abilities of babies and toddlers has grown enormously. Although Chomsky himself has never directly worked in this field, his theoretical positions are what made the field possible in the first place.

This brings us naturally to philosophy. As mentioned above, Chomsky has advocated a form of Cartesian rationalism: the view that knowledge is determined largely by the nature of the mind itself, with experience playing only a triggering role. His principal argument for this position is the poverty-of-the-stimulus argument from first-language acquisition, described in the previous paragraph. Chomsky, however, eschews dualism, instead taking the view that the language faculty must be ultimately instantiated in neurological mechanisms (although we are a long way from understanding how this works) and that innate ideas must be part of the genome. Chomsky's ideas about language and language acquisition did much to reignite discussion of rationalist theories of knowledge, especially in the English-speaking world.

Another area where Chomsky's contributions have been important is computer science. In the late 1950s and early 1960s Chomsky worked, with various colleagues, on the abstract question of how different kinds of rule systems can generate different kinds of infinite sets of expressions. This work led to what is still known as the "Chomsky hierarchy" of formal languages, and still appears in computer-science textbooks.

The above may give the impression that Chomsky's work was mostly carried out decades ago. Although much ground-breaking work was done in the 1950s, and of course the benefit of hindsight makes it easy to see the importance of those ideas, Chomsky has never ceased to develop and revise the details of his theory, particularly in syntax. Over the past fifteen years or so, his ideas have taken a radically new turn with the postulation of the Minimalist Program for linguistic theory. The minimalist program asks a question that was never explicitly asked before: how well-adapted is the language faculty for its function in relation to other aspects of cognition? To put it another way: how little do we have to say in our linguistic theory given, on the one hand, the basic fact that the linguistic system relates sounds and meaning through a generative rule system, and, on the other hand, the inherent constraints imposed by the physical world and by logic? The minimalist program thus consists in developing analyses of natural-language phenomena which attempt to render the rule system as simple and general as possible. Chomsky has even suggested that natural language may, in some non-trivial way, be a perfect system, i.e. one which is optimally structured for the purpose of relating sound and meaning. This is now known as the Strong Minimalist Thesis. Although highly speculative, this idea is both provocative and profound.

The minimalist program has led to a very drastic revision of many of the formal, technical aspects of the theory of syntax. Leaving those aside, however, it has also altered the conceptual basis of the field. Chomsky (2004) argues that the notion of explanatory adequacy, the idea that a linguistic phenomenon is explained if we can explain how children can acquire it given the poverty of the stimulus, which since 1964 he had argued to be the goal of linguistic theory, may not be the ultimate goal. There may be a still deeper goal: that of explaining how the highly imperfect-seeming properties of natural languages are in fact derived from an ultimately perfect system. A further recent development emerges from Chomsky's collaboration with the evolutionary biologists Hauser and Fitch in a 2002 paper in *Science* on the evolution of language (Hauser, Chomsky, and Fitch 2002): here Chomsky and his co-authors suggest that rather little in language may be domain-specific, i.e. specifically evolved for the purposes of the language faculty. We will return briefly to the question of language evolution below.

Professor Noam Chomsky has warmly accepted our request that the Senshu Project issue a volume including his three earlier papers as follows: "Systems of Syntactic Analysis" (1953), "Some Methodological Remarks on Generative Grammar" (1961) and "Knowledge of Language: its Elements and Origins" (1981).

PROSPECTS FOR THE FUTURE

Language research in the 21st century covers a range of very diverse fields including philology, descriptive grammars of particular languages, historical linguistics, language typology, generative grammar, bio-linguistics, neuroscience, and bioscience.

In a recent volume, Chomsky (2004: 187) states his concern with human biology as

> Language can and should be studied from many different points of view, hence in many different disciplinary contexts. … The parts of the study of language that we've been talking about seem to me to fall, in principle, into human biology.

McGilvray (2009: 4) points out Chomsky's change of focus concerning mind and language as follows:

> In recent years Chomsky's label for his approach to mind and languages has changed from "rationalistic" to "biolinguistic." … The label change highlights a characteristic work; the aim has always been to try to accommodate the science of language to some natural science, thus biology – for biology alone can explain how language is innate, why it is unique to humans, and how it grows.

In this connection, one might ask what the connection may be between the biolinguistic programme as Chomsky has recently outlined it and historical linguistics, including in particular diachronic syntax.

If we take the view that the language faculty is a system of principles and parameters, with the parametric variation determining and constraining how languages may vary and change, then we can see a very clear and intriguing connection. Because grammars are recreated by each cohort of acquirers within the tight constraints imposed by the language faculty, the variation and change that is so prevalent in language arises. All that seems to be required for this is for certain parts of the system to be open to variation and the poverty of the stimulus; given these conditions, different adult systems will emerge (this point is demonstrated very clearly in Niyogi (2006)). These constantly innovated, minutely varying systems stabilise after the critical period for language acquisition, and typically become associated with social and cultural value (in an ultimately quite arbitrary way, as far as the system itself is concerned). The ongoing, inevitable propensity for variation, determined by the parametrised parts of the formal system, leads to the creation of new systems which fit into the social value system in different

ways. Thus a parametrised language faculty, allowing random variation in a few small areas, gives rise to the phenomena of variation – both sociolinguistic and cross-linguistic – and change. And children have the ability to acquire these systems along with the variation and, under conditions whose precise nature remains to be determined, they have the capacity to subtly modify the system.

The study of historical syntax can, in these terms, find its natural place in the cognitive sciences. What will hopefully develop is a greater understanding of each of the three elements which, according to Niyogi (2006), contribute to the dynamical system that is a language being spoken by a population. We need to better understand the nature of language learning and acquisition through empirical work on language acquisition and theoretical work on learnability; we need to better understand the relation between language variation and populations through empirical work in sociolinguistics and theoretical work on the computational modelling of population dynamics. Finally, we need to better understand the properties of the set of grammars through empirical work in language typology and theoretical work in grammatical theory. Principles and parameters theory is obviously central to this last enterprise, itself crucial to a full understanding of language change.

The obvious question that these remarks give rise to is what the nature of the variation in the language faculty is, and why should it vary at all. Berwick & Chomsky (2008) suggest an interesting view on this question, which ultimately traces the answer to the way in which the language faculty may have evolved. They sketch an account of the evolution of language which involves four separate components: (i) the development of the syntactic system (which, in the context of the Minimalist Program, largely reduces to a single combinatorial operation, known as Merge); (ii) the development of the connection to the conceptual-intentional system of thought, which may be closely linked to (i); (iii) the development of the means of "externalization" of thought through speech, entailing the existence of phonology and morphology, and (iv) the development of the lexical atoms. Berwick & Chomsky argue that language may be fundamentally a "tool for thought", and that, hence, (i) and (ii) are intrinsically linked. Leaving aside (iv), which to some degree remains mysterious, they suggest that "externalization" of thought was a secondary process, possibly one which combined pre-existing cognitive abilities rather than involving a special mutation. In this connection, they (*ibid*.: 15) say:

> Externalization is not a simple task. It has to relate two quite distinct systems: one is a sensorimotor system that appears to have been

> basically intact for hundreds of thousands of years; the second is a newly emerged computational system for thought, which is perfect, insofar as the strong minimalist thesis is correct. We would expect, then, that morphology and phonology – the linguistic processes that convert internal syntactic objects to the entities accessible to the sensorimotor system – might turn out to be quite intricate, varied, and subject to accidental historical events. Parameterization and diversity, then, would be mostly – possibly entirely – restricted to externalization. That is pretty much what we seem to find: a computational system efficiently generating expressions interpretable at the semantic/pragmatic interface, with diversity resulting from complex and highly varied modes of externalization, which, furthermore, are readily susceptible to historical change.

In this context, studying historical change may be a question of understanding the variation in the range of possible externalization strategies made available by the language faculty. This is clearly true for morphological and phonological change, on this view. However, syntactic change may raise further questions. One central question that this view raises is: how much of the syntactic variation that we see in the world's languages is due to externalization processes and how much is due to the core computational system of syntax? Given the logic of the above quotation, this is one way of investigating the overall correctness of the Strong Minimalist Thesis. From another perspective, the core computational system may be perfect but still variable: its perfection may indeed entail a certain variability. Once again, the study of change and variation as observed in languages across time and space may shed light on these questions. In this way, we can understand how some the traditional concerns of historical linguistics, seen in a new light, may be directly relevant for the biolinguistic programme.

CURRENT ISSUES IN LANGUAGE DESCRIPTIONS

In his contribution to this volume, Askedal describes Germanic passive constructions and proposes a comparative classification of passive constructions in modern standard Germanic languages and general typological characteristics of the languages: the Insular Scandinavian languages, Icelandic and Faroese; the modern Mainland Scandinavian languages, Danish, Swedish and Norwegian; the Continental Germanic languages, Modern West Frisian, Dutch and German; and English.

Fujiwara is in his paper "Prosodic Constraints on Old English Alliteration" concerned with Old English poetry and considers the distinction between compound words and complex words and argues that secondary

stresses on the second elements of compound words are qualified for alliteration in the same way as primary stresses on the first elements, while tertiary or zero stresses are irrelevant to alliteration.

Miyamae offers in her article "The Historic Role of Genitives in the Emergence of DP" an investigation of the historical development of the English nominal construction in terms of emergence and establishment of a new functional category D. She proposes that many factors and motives in the preceding period contributed to this drastic syntactic change in the latter half of the 15th century.

Tani discusses the word pairs in Chaucer's verse in comparison with those in his prose and argues that the function of the Word Pairs in the verse is interlinked with rime in stark contrast to that in the prose and that the verse texts in Fragment I of *the Canterbury Tales* can be classified into three groups.

In his paper "A Short Note on Movement and Control in the English Noun Phrase", Hamamatsu claims that the Agent DP, realized as subject in 'John's attempt to gain attention (failed)', appears to be 'demoted' in 'The attempt of John to gain attention (failed)' within the noun phrase and that the movement approach to control offers a neat explanation for the alternation.

Hosaka argues in his article "Complement Capacities in German: Three Types of Complements" that the complement capacities have correlations with the syntactic properties shown in passivization in German. The passivizability of verbs with infinitival complements is dependent on some conditions.

In their paper "Coordination and Subordinating Conjunctions in Spoken American English", Iyeiri, Yaguchi and Baba discuss the employment of coordinating and subordinating conjunctions in spoken American English, paying special attention to their uses in different styles of professional English in conferences and meetings and investigating The Corpus of Spoken Professional American English (CSPAE).

The papers from these various branches deal with fundamental issues in the fields of Generative Grammar and language descriptions. They share the common goal of contributing to our understanding of these areas.

The Senshu Open Research Project 'The Development of the Anglo-Saxon Language and Linguistic Universals' was selected for funding as one of several promising and unique projects in Japan by the Ministry of Education, Sports, Culture, Science and Technology in 2005 and has been supported by Senshu University in conjunction with the Ministry.

The Senshu Project organized in the academic year 2008 and 2009 three International Conferences with lectures devoted to 'Phonetics as Brain Training', 'On Parametric Syntax with special reference to English and East Asian Languages,' and 'Language Typology'. The following scholars were invited to the conferences: Michael Ashby (Experimental Phonetics, University College London), John Ole Askedal (Germanic Linguistics, University of Oslo), Berndt Heine (Language Typology, University of Cologne, emer.), C.–T. James Huang (Generative Grammar, Harvard University), Heiko Narrog (Japanese, Tohoku University), and Ian Roberts (Diachronic Syntax, Cambridge University).

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REFERENCES

Berwick, R. C. & N. Chomsky. 2008. "The Biolinguistic Program: The Current State of its Evolution and Development". Ms. MIT. In *Biolinguistic Investigations*. Forthcoming. A. DiSciullo & C. Aguero eds. Cambridge: MIT Press.

Chomsky, N. 1953. "Systems of Syntactic Analysis". *The Journal of Symbolic Logic*, Vol. 18, No. 3. 242-256.

———— 1955. *The Logical Structure and Linguistic Theory*. Ph.D. dissertaion. University of Pennsylvania. (Published in 1975. New York and London: Plenum Press.)

———— 1957. *Syntactic Structures*. The Hague: Mouton.

———— 1959. "Review of *Verbal Behavior* by B.F. Skinner". *Language* 35, no. 1 (January-March 1959): 26-57. (Reprinted as no. A-34 in the Social Sciences by Bobbs-Merrill, Inc.; reprinted in *The Structure of Language*, edited by Fodor and Katz. New York: Prentice-Hall. 1964; reprint (in French). *Language* 16 (December 1969): 16-49; reprinted in *Readings in Philosophy of Psychology*, edited by N. Block, 48-63. Cambridge: Harvard University Press. 1980; reprinted in *Ajattelu, Kieli, Merkitys: Analyyttisen Filosofian Avainkirjoituksia*, 279-310. Helsinki: Gaudeamus. 1997.)

———— 1961. "Some Methodological Remarks on Generative Grammar". *Word*. Vol. 17. No. 2. 219-239.

———— 1981. "Knowledge of Language: its Elements and Origins". *Philosophical Transactions of the Royal Society of London*. B 295, 223-234.

———— 2004. *The Generative Enterprise, Revisited*. Berlin: Mouton de Gruyter.
———— 2009. *Cartesian Linguistics*, 3rd Edition. Cambridge: Cambridge University Press.
———— & M. Halle. 1968. *The Sound Pattern of English*. New York: Holt, Rinehart and Winston.
Hauser, M. D., N. Chomsky, and W. T. Fitch. 2002. "The Faculty of Language: What is it, Who has it, and How did it Evolve?" *Science*, Vol. 298, 1569-1579.
McGilvray, J. 2009. "Introduction to the Third Edition". In N. Chomsky 2009, 1-52.
Niyogi, P. 2006. *The Computational Nature of Language Learning and Evolution*. Cambridge: MIT Press.

1.
Genesis of Generative Grammar

Systems of Syntactic Analysis*

Noam CHOMSKY

1. INTRODUCTION[1]

During the past several decades, linguists have developed and applied widely techniques which enable them, to a considerable extent, to determine and state the structure of natural languages without semantic reference. It is of interest to inquire seriously into the formality of linguistic method and the adequacy of whatever part of it can be made purely formal, and to examine the possibilities of applying it, as has occasionally been suggested,[2] to a wider range of problems. In order to pursue these aims it is first necessary to reconstruct carefully the set of procedures by which the linguist derives the statements of a linguistic grammar from the behaviour of language users, distinguishing clearly between formal and experimental in such a way that grammatical notions, appearing as definienda in a constructional system, will be formally derivable for any language from a fixed sample of linguistic material upon which the primitives of the system are experimentally defined. The present paper will be an attempt to formalize a certain part[3] of the

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Received October 18, 1952.

1 Within linguistics, the source for these investigations is in the methods of structural analysis developed by Z. S. Harris; within philosophy and logic, it is in the work of N. Goodman on constructional systems and in the development of nominalistic syntax by Goodman and Quine. As general references, then, for this paper, see HARRIS, ***Methods in structural linguistics,*** Chicago, 1951, GOODMAN, ***The structure of appearance,*** Cambridge, 1951, and GOODMAN and QUINE, *Steps towards a constructive nominalism*, this JOURNAL, vol. 12 (1947), pp. 105-122. I am much indebted to Professors Harris, Goodman, and Quine, as well as to Y. Bar-Hillel, H. Hiż, and others, for many suggestions and criticisms.

2 E.g., W. V. QUINE, *Notes on existence and necessity*, ***Journal of philosophy,*** vol. 40 (1943), pp. 120. Also, see Z. S. HARRIS, *Discourse analysis*, ***Language,*** vol. 28(1952), pp. 1-30, for an investigation of the possibility of using methods of linguistics to determine the structure of a connected short text, thus, in a sense, setting up partial synonymity classes for it.

3 The constructions of this paper are roughly coextensive with the procedures of chapters 15, 16, ***Methods.***

linguist's generalized syntax language.

From another point of view, this paper is an attempt to develop an adequate notion of syntactic category within an inscriptional nominalistic framework. The inscriptional approach seems natural for linguistics, particularly in view of the fact that an adequate extension of the results of this paper will have to deal with the problem of homonymity, i.e., with a statement of the conditions under which tokens of the same type must be assigned to different syntactic classes. It will appear below that the calculus of individuals can often supply quite simple solutions to constructional problems that seem on the surface to require a set-theoretic solution, thus removing the necessity for an involved hierarchy of types and increasing the overall workability of the system.

There are several ways in which we might approach the concept 'belong to the same syntactic category.' We might consider assigning elements to the same category only if they have all contexts in common (i.e., are mutually substitutable in all sentences), if they share some context, or if the ancestral of this latter relation holds between them.[4] All three suggestions are too restrictive for the general case which we wish to consider.[5] In particular, consider the following six-sentence text:

(1) 'ab', 'cb', 'de', 'fe', 'axd', 'cyf'.

To attain the purposes of this constructional attempt, we must be able to assign 'x' and 'y' to the same category. The general procedure which we wish to reconstruct is roughly as follows. If, in a given body of material, two elements occur in sentences which differ only in these elements (e.g., 'a' and 'c' occur in the context '..b', 'd' and 'f' in '..e', in (1)), then the two elements are assigned to the same class. But now two expressions differing term by term only in elements previously assigned to the same class (e.g., 'a..d' and 'c..f') are identified, thus shrinking the totality of contexts and allowing new elements (e.g., 'x' and 'y') to be put into the same class on the basis of occurrence in the same sentential context. When this process can be carried no further, considering expressions of any length and degree of discontinuity as elements, the resulting classes are the broadest syntactic categories for this text.

Before proceeding with the actual constructions, it should be made clear that the present system as given here is not adequate for the analysis of

[4] See Y. BAR-HILLEL, *On syntactic categories*, this JOURNAL, vol. 15 (1950), pp.1-16, for a development of these notions.

[5] The third suggestion is actually equivalent to the system adopted here for the special case of languages in which each sentence contains exactly two elements (morphemes).