LINGUISTICS AND ANTI-SCIENCE

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In 1957, Noam Chomsky's *Syntactic Structures* was published. It introduced an approach to linguistics which was different not only in strategy but in kind from other approaches to linguistics that were then current. It claimed to be a truly 'scientific' approach to the study of language, and many linguists who found it congenial adopted it as their own. Many others, however, found that Chomsky's approach seemed to be in conflict with their own ideas of what a science should be, and they rejected it. The result was the establishment of two separate schools of linguistics with different philosophies of analysis: the generative grammarians, who accepted Chomsky's ideas, and the structuralists, who did not.

Since that time, books have been written and papers have been given attempting to show that one or the other of these two schools is superior, and in some cases scholarly objectivity has yielded to less scholarly polemics. In most of the examples of such polemicizing, moreover, what should be the central point of these discussions has been either slighted or completely overlooked: that is, that structural and generative linguistics differ not merely in their strategies of analysis, but in their philosophies of linguistics, and ultimately in their conceptions of the nature of science. Unfortunately, each group proceeds as if its own criteria were the only thinkable ones, and frequently criticizes the other school for its failure to meet these criteria. The arguments of each side seem to form into large droplets which go rolling off the feathers of their intended hearers without soaking in; the result is increasing frustration and sometimes even anger, pointed comments about obstinancy, stubbornness, and closed minds, and increasing difficulty for the linguists of either camp to communicate with their colleagues in the other. It will be my purpose in this paper to take one more look at this controversy, a look which will hopefully be somewhat less polemic and more objective, and which will concentrate on basic differences in outlook rather than on the associated differences of strategy and method.

As a framework for my discussion, I will consider most of the points raised in one of the most recent salvos in the Great Generative-Structuralist Controversy, the article "Some Recent Developments in American Linguistics," Neuphilologische Mitteilungen 2 LXX, Helsinki, 1969, pp. 192–227, a copy of which was kindly sent to me by its author, Robert A. Hall Jr., of Cornell University.

It appears that the parties to the above mentioned controversy consider each other 'unscientific', and they are both quite right. Each group views the other from within its own scientific paradigm,[1] each paradigm provided with its own goals, its own standards,

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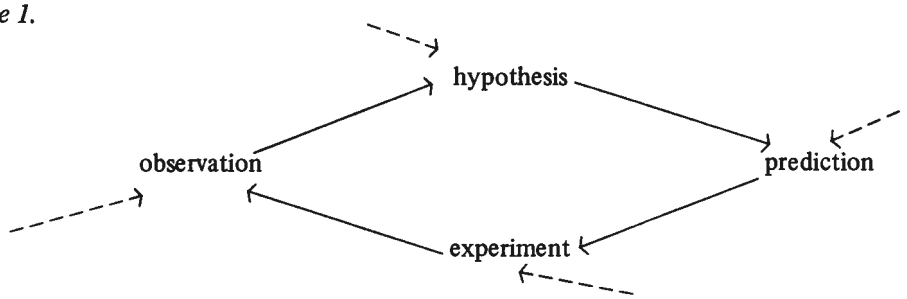
[1]George W. Grace. Notes on the Philosophical Background of Current Linguistic Controversy. *Working Papers in Linguistics* No. 1, Department of Linguistics, University of Hawaii, Honolulu, 1969, pp. 1–41.

My debt to Grace's paper will be apparent throughout this article, so I will make a blanket acknowledgement here.

its own methods, and its own criteria of accomplishment. Any activity which does not meet the requirements of a particular paradigm may be considered 'unscientific' by the adherents of that paradigm, and if more than one paradigm exists at a particular time, every approach to science can be 'unscientific' from somebody's point of view. If there were a clear and explicit statement from each school as to what its goals were and what methods were legitimate in reaching them, it would immediately become obvious that most of the issues raised are actually irrelevant within the framework being criticized. It is often hard to find such statements, however, because scientific paradigms are characteristically not discussed as such, but are presented to novices in a science as self-evident matters, obvious facts about scientific activity which are never even directly discussed, much less questioned. They come to seem so natural and obvious to those who are exposed to them that anyone who does not immediately accept them seems wrong-headed or foolish. In the following remarks, I will try to evade this bias (with a few lapses, as the reader will discover) and refrain from criticizing scientific activity within one paradigm in terms of the criteria of another. The two alternative approaches to linguistics must be examined at their most basic levels; although we cannot criticize one theory for not meeting the criteria of the other, we can try to compare the criteria themselves, to see first of all whether the frameworks they define are capable of accommodating all observed data (assuming agreement about what constitutes legitimate data), and, if they are, whether their goals are in fact interesting or useful ones.

The definition of 'science' which Robert A. Hall, Jr. gives on page 46 of his article corresponds to the definition of the 'hypothetico-deductive' approach given, for example, in Grace's paper.[2] According to this definition, scientific activity consists of making observations, forming hypotheses, making predictions, testing the hypotheses, observing the results, and modifying the hypotheses or creating new ones.

Figure 1.



The process is a cycle which can be entered from any point, not only from 'observation'.

When a hypothesis can account for observed phenomena and correctly predict as yet unobserved phenomena, it is tentatively accepted as correct, and we say the phenomena have been 'explained' by the hypothesis. A scientific explanation may thus be represented by the formula:

$$X, Y \rightarrow Z$$

which might be read from left to right as, "Given particular values for X and Y, we can predict a value for Z," or, from right to left, "Z is explained in terms of X and Y." In practice, X and Y are frequently mathematical constructs of varying degrees of abstraction

[2]Ibid, p. 16.

which correspond to an assumed reality in the phenomenon being described. Although the 'realities' may not be directly observable, these constructs are considered to be justified if they do in fact make it possible to make the correct prediction in all cases. A crucial characteristic of such a theory is its potential testability. From the hypothesis, we formally[3] derive explicit predictions, then set up an experiment to see if the predictions are empirically confirmed or not.

From these considerations, we can derive the requirement that a theory contain a formal (explicit, non-meaningful, self-contained) system for deriving predictions, which may be referred to as a 'calculus'.[4] Thus, if we are given a hypothesis that, say, the cost of living is always equal to 110 per cent of one's salary, and if at a particular time we know both the cost of living and our salary, there must be some means of computing the value of 110 per cent of the salary to see if this is in fact equal to the known cost of living. If it is not, the theory is then falsified. This means that even such a simple theory must include a fairly complex 'calculus,' arithmetic, including multiplication and decimals. The requirement that a theory be 'formal' is really a special case of the requirement that it be explicit; this is essentially the requirement that the theory be able to make explicit predictions. Even if we do have access to an appropriate calculus, it may still be useless if some other part of the theory is inexplicit. If for example we make a calculation and find that the cost of living is equivalent to 110 per cent of our gross salary, but 250 per cent of our take-home pay, we cannot tell whether the hypothesis has been confirmed or not.

The hypothetico-deductive paradigm implicitly recognizes that the creative processes by which hypotheses are arrived at is still mysterious. Thus it provides no rigorous procedures for arriving at or evaluating hypotheses. A hypothesis which results from a drug trip or a religious vision is just as good as one which results from years of dedicated study and contemplation, as long as it makes correct predictions. It may refer to ether, phlogiston, or gremlins, as long as it can be tested.

Chomsky and the generative grammarians are now attempting to apply the hypothetico-deductive scientific framework to the study of language. Because of their belief that children are born with predisposition to learn human language rather than with just a data-processing and inducing device,[5] they have been characterized as espousing the traditional rationalist doctrine of innate ideas, the view that a child is born with some a priori knowledge about the universe. They have been more than happy to accept this appellation, but as has been pointed out repeatedly,[6] the term is hardly appropriate; it is more accurate to say not that the child has *a priori* knowledge of the universe, but rather that he has a built-in *capability* for learning language; that the child is indeed a tabula

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[3]The predictions must be reproducible, and not subject to the whims and wishful thoughts of the persons applying them.

[4]R.B. Braithwaite, "Scientific Explanation." Cambridge, 1953, pp. 25–26.

[5]Cf. Noam Chomsky, Aspects of the Theory of Syntax, MIT Press, Cambridge, 1965, p. 32.

[6]Cf. the second part of Sidney Hook's "Language and Philosophy", New York University Press. New York, 1969, especially p. 132 of Arthur Danto's contribution, 'Semantic Vehicles, Understanding, and Innate Ideas'. Cf. also Hans Aarsleff's "The History of Linguistics and Professor Chomsky", Language Vol. 46, No. 3 (1970), pp. 570–585.

rasa, but a tabula pre-patterned to accommodate data of a certain type. Hypotheses about the preprogrammed structure of this data-processing device are subject to exactly the same constraints as any other theory in the hypothetico-deductive framework, and thus in practice, generative grammar is no more 'rationalist' than genetics or astronomy.

Since the unseen realities to which linguistic theories attempt to characterize are presumed to have their locus in the heads of human beings, rather than in chromosomes or in the Crab Nebula, and to be somehow connected with the human 'mind', generative grammar is also referred to as 'mentalistic'. This term however holds no horrors for generativists; science studies nature, and if we assume that man is a part of nature rather than an exception to it, then any aspect of man and his behavior is fair game for science, and it is not surprising to find that an explanatory theory of human behavior refers to something that cannot be directly observed. After all, if we could observe everything directly, there would be no need for theories.

In Hall's article, it is claimed that structural linguistics also operates within the same hypothetico-deductive paradigm, yet in actual practice there is at least one crucial difference; that is that although the structuralists certainly do have their 'theories' about language, they are uninterested in making their theories explicit to the point of constructing the formal apparatus necessary to make the crucial tests required by explanatory science. For them, as Martin Joos[7] has stated, "Children want explanations, and there is a child in each of us; descriptivism makes a virtue of not pampering that child." Instead, they are solely concerned with observing linguistic data and describing them rather than explaining them. Thus the name 'descriptive linguistics' is not inappropriate. They have dispensed with the prediction and testing phases of the hypothetico-deductive paradigm, and are interested only in objectivity and 'empiricism', which, since it can no longer refer to the falsification of hypotheses, must apparently be understood to mean some sort of pure induction and description. Thus they are not 'empirical' scientists in the usual sense at all, any more than generative grammarians are true rationalists.

They have imposed on their science the requirement that only those regularities and generalities that can be expressed as being derived directly from observations by certain accepted methods are acceptable in a structuralist description. Such a limitation if imposed on explanatory empirical science would of course quickly and effectively stifle all progress. It would be hard to imagine a comparable group of physicists accepting an analogous restriction, for example the requirement that all theories about falling bodies be stated as computer-calculated generalizations about the paths and motions of falling leaves, staggering drunks, landing helicopters, etc. Only one other modern science, behavioral psychology, seems to share this philosophy.

In the following sections I will attempt, in as much as lyeth in me, to dispassionately discuss some of the more basic points on which structural and generative grammarians differ, in particular those raised by Hall in his "Some Recent Developments in American Linguistics". Since I know of no clear statement of the general philosophy of descriptive linguistics (as opposed to statements of methods of analysis, etc.), I have had to make certain inferences. If there are any incorrect ones, I hope I will be corrected.

In comparing the two approaches, much time could be saved if we could require of each linguist a clear and direct statement as to what he considered the legitimate goals

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[7]Martin Joos, "Readings in Linguistics", American Council of Learned Societies, New York, 1958, p. 96.

and/or methods of a science, and why these goals were interesting or significant. Such a statement would force each linguist to decide exactly what he was trying to accomplish and what he considered off-limits. He could then no longer be criticized for failing to meet standards imposed by someone else, which seems to be the current practice. Rather, criticism would have to show 1) that he has failed to answer the questions he posed for himself, or, more basically, 2) that the questions themselves are uninteresting or meaningless. Thus, instead of asking whether Bloch's studies of Japanese meet Chomsky's three levels of adequacy, or rejecting Lakoff's Abstract Deep Structures as 'fictions', we should be asking whether both approaches are compatible with all observed linguistic data within their declared scopes, and if so, whether each grammar had done what it set out to do. Only then would the question arise as to whether it is a more interesting and useful activity to write descriptive grammars or generative ones. Even in such basic discussions, it will be important to define one's terms. For example, while both schools would probably accept the requirement that a grammar be 'useful', a descriptive linguist might be thinking in terms of practical applications to language teaching, while a generative grammarian would be more concerned with whether the grammar gave him any help in deciding what the general characteristics of human language were. And while the term 'interesting' is a technical term used in generative grammar to mean roughly 'having a bearing on the resolution of theoretical questions', it is not clear that structural linguists would accept this as a relevant criterion in evaluating scientific paradigms. In fact, there is a legitimate philosophical question as to whether distinct paradigms compatible with observed data are strictly comparable at all according to any independent evaluation metric. Who can tell me my questions are 'uninteresting'? I am the only one who can decide what interests me.

In comparing the descriptive and generative schools of linguistics, Hall presents a table comparing their approaches to the analysis of language on page 221. It is stated as a directional mapping, listing the aspects of scientific empirical investigation which the generative grammarians have rejected, and indicating for each what they have substituted for it. Had the same article been written by a generativist, on the other hand, a similar table might have appeared, but it would probably have chosen a somewhat different set of terms. Hall's table is reproduced below, followed by a corresponding version compiled from a generative point of view:

Generative grammar entails:

Rejection of:	*Espousal of:*
1. Objectivity	Subjectivity (including mentalism)
2. Inductive approach	Deductive (aprioristic) approach
3. Data	Intuition (especially for grammaticality)
4. Formulation of observations	Rationalism
5. Independence of linguistics	Subservience to other fields
6. Break with traditional grammar	Return to traditional grammar

Rejection of:	*Espousal of:*
7. Speech	Writing
8. Language in its social function	Logic

On the other hand, the corresponding table as viewed by an adherent of the hypothetico-deductive philosophy of linguistic analysis might look like this:

Generative grammar currently entails:

Rejection of:	*Espousal of:*
1. Behaviorism	Hypothesis
2. Discovery procedures	Testing of hypotheses
3. Sounds of the speech act as the sole object of analysis	Speaker's knowledge of his language
4. Segmentation and classification of texts	Explanation of data in terms of speaker's knowledge
5. Isolation of linguistics	Integration of linguistics into the family of hypothetico-deductive sciences
6. Break with traditional grammar	Explicit formulation of the insights of traditional grammar
7. Speech as the primary manifestation of language	Competence(s) underlying both speech and written language
8. Superficially diverse manifestations of language	Underlying system of language competence

We might sum up the differences by saying that structural grammar is interested in describing primary data, while generative grammar is concerned with explaining linguistic competence.[8] The idea of 'independence of linguistics' does not seem to be a necessary

[8]In his "A Suggested Addition to Stanley Starosta's 'Linguistics and Anti-Science'," (Mimeo, Department of Linguistics, University of Hawaii, Honolulu, 1970) Charles-James N. Bailey has proposed a third 'conceptual' table to contrast with the two tables above. He considers 'conceptualism' to be the philosophical basis of the approach to linguistics of William Labov and like-minded linguists:

Static (empiricist or rationalist) Theory:	*Dynamic Theory:*
1. Fiction of homogeneity accepted.	Everyone speaks a "transitional dialect".
2. Saussure right about excluding time and space from description.	Saussure wrong in excluding time and space from the description of *langue*.
3. Saussure wrong in regarding *langue* as social.	Saussure right: *langue* is social.
4. Only equipollent options admitted; merely listed	Weighted, ordered variables and their implicational and other patternings analyzed.
5. Competence analysis: "Would you say . . .?"	Competence: What one can understand and perhaps mimic.
6. Intuition all in or all out.	Intuition a useful discovery procedure, not a proof; counter-intuitive results not admitted.
7. Production binary.	Perception binary.
8. Either no innateness and no universals; or knowledge is innate.	Not knowledge, but universal mechanisms and potencies, are innate.

part of the descriptive paradigm, but rather seems a separately motivated criterion. (see below).

The reader will note in comparing the two tables that in only two places is there any appreciable unanimity: that is that both tabulators would agree that generative grammarians have rejected a break with traditional grammar, and that they do reject speech as the sole legitimate object of linguistic inquiry. In the first table, the left-hand column represents what Hall considers the criteria of objective science, and since generative grammarians have rejected them, they must of course be 'anti-scientific'. In the second table, the right-hand column represents the prerequisites of an explanatory approach, and it is the left-hand column which might be analogously rejected as 'anti-scientific'.

In comparing the two approaches to linguistic science, the role which theory plays in each is especially important. Clearly, a structuralist speaking of a 'theory of language', as Hall frequently does, has something in mind which is quite different from what generativists mean by the term. A structuralist description of a language is basically the result of operations of segmentation and classification performed on a particular text or group of texts. It makes no attempt at explanation or prediction. (Any grammar which *does* make such an attempt is of course by definition generative, not structural, and thus subject to the verification requirements of the hypothetico-deductive framework.)

The 'theory' mentioned is the list of operations which are to be applied to data. Psychological reality is no longer claimed for the elements which result from these operations,[9] and an analysis is justified if it has been performed according to the prescribed methods. There is prediction involved in such a theory only in the sense that it is predicted that the prescribed procedures can be applied to any language. Given the looseness and flexibility of these operations, this is a minimal claim, but it is still strong enough to contradict the criterion of empirical objectivity expressed by Martin Joos,[10] that "languages could differ from each other without limit and in unpredictable ways." In practice, of course, no one accepts this dictum at face value, and a structural linguist would be surprised and suspicious if he were informed that some particular language had no phonemes, or had monophonemic morphemes only, or had a labio-digital trill as an allophone of a nasal fricative. That is, there is at least implicitly a generally accepted picture of the kind of structures and features human languages can have, though I know of no full and explicit list of these 'prejudices'. There is a recognition that some sounds people make, such as belches, hiccoughs, and lawrencewelkian digital-oral clicks, are not part of language, and that some things that informants utter, such as hesitation pauses, false starts, and slips of the tongue, are at best marginal phenomena, and not to be included in the main description. No structuralist would by choice employ an informant who is a chronic alcoholic, an aphasic, or a person under the influence of scopalomine. That is, there is a practical admission that language is a system, and that some phenomena are inside while others are extra-systematic and out of bounds.

Within the hypothetico-deductive framework, a 'theory' has a rather different status. It is an abstract formal object, a 'logical' system in Hall's terms,[11] which 'explains' observations as the results of general laws. It makes explicit predictions, and provides an explicit

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[9]Joos, op. cit., p. 80.

[10]Ibid., p. 96.

[11]Hall, op. cit., p. 220.

means for matching the predictions to the observations. Hall is quite correct in stating that generative linguists know both the input and the output in advance, at least in the initial stages. They have the theory and the initial data, and they are interested in relating them; however, they are also interested in predicting new phenomena, and here it would be incorrect to say that they already knew the output before they started, since it is potentially infinite. In current versions of generative grammar, the abstract objects established to explain the data are usually called 'deep structures', a designation to which Hall objects (203) because of the positive connotations of the word 'deep' as opposed to 'surface' in English. A somewhat more interesting criticism is that "The distinction between 'surface' and 'deep' structures should be given up, since no such contrast exists: there are only structures and their meanings".[12] If the question raised by Hall as to whether 'deep structures' (or 'electrons' or 'genes') actually 'exist' is one of direct observability, it is trivial; if we could observe them, we would not need to construct theories about their nature and properties. If Hall is claiming literally that deep structures do not exist, philosophers might be interested in seeing how he goes about proving such a claim. The interesting point is that within the structuralists' framework, observability is equated with existence, and from that point of view Hall's statement is true: by his definition, nothing exists unless it can be observed; thus atoms, genes, deep structures, and even phonemes and phones are 'fictions'. Going one step deeper into this bog, we may note that since pure objective observation is impossible due to the character of human perception, it seems to follow that *nothing* exists, including this article and you yourself, dear reader.

A neat summary of Hall's attitude toward theory is his statement[13] that "the construction of such sets of formulas may be an amusing or interesting activity; but it will always fail to allow for the non-predetermined, unpredictable speech activity of live human beings". This statement raises the empirical question par excellence, for what the generative grammarians claim is exactly that their 'amusing formulas' *will* account for non-predetermined speech activities of human beings (though not necessarily connecting it with the context in which it is used), and more fundamentally, that given a predictive theory, the activities of speakers *are* predictable. This predictable regularity is the basic assumption of explanatory science, and if the predictions made are false, it should be a simple matter for anyone who does not accept them to provide counter-examples.

The scientist's assumption in constructing mathematical models, such as 'deep structures' in linguistics and atoms in physics, is that if the output of the model corresponds to the observed and yet to be observed phenomena, then the various parts of the model correspond to some sort of reality within the phenomenon to be analysed. Thus, if a theory incorporating 'deep structures' can account for observed syntactic phenomena and predict new phenomena, it is presumed to correspond to some kind of reality, whose properties and formal characteristics have been described in terms of the hypothesis.[14] If a grammar incorporating predominately binary immediate constituent cuts accounts for the data correctly, then binary cuts are justified and confirmed. If anyone claims, as Hall does, that

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[12]Ibid., p. 203.

[13]Ibid., p. 206.

[14]Probably most scientists believe that their constructs have some sort of reality and physical correlates, but this is not a central question, within any particular science, and it has no bearing on their methods or results. We can of course hope that neurosurgery will some day develop to the point where we can find out what physical mechanisms correspond to our theoretical constructs, and in light of the fact that genes, for example, have now actually been isolated and observed, perhaps this is not too ridiculous a hope.

generative phrase structures are "excessively binary", his objection will be readily accepted as soon as he produces linguistic data which cannot be accommodated within such a framework, or can be more adequately explained by some other device. It will then be up to the generative grammarians to modify the theory to account for the new data or throw the theory out, and then up to the non-generative linguists to find more counter-evidence for the generativists to account for. It is conceivable that a very productive symbiosis could develop in this way, with structural linguists contributing to the construction of better and better generative grammars, perhaps in spite of themselves.

As mentioned, the hypothetico-deductive method places no requirements on the legitimate ways in which theories may be constructed or discovered, nor on the kinds of elements which they may or may not refer to, as long as the resultant theories are testable. Thus, Hall's objection to the arbitrariness of semantic features is in one sense quite correct, but it is not a serious one for generative grammarians: the features are justified if they 'work', that is, if they are compatible with observations and contribute to explanatory power, and the actual names given to them are necessarily arbitrary, at least initially. As in the case of phonological features, it is hoped that as the theory develops they will become less and less arbitrary, and more closely approximate physical reality, though exactly what this means is much harder to determine for semantics than for phonology. It is very interesting to note, however, that some currently proposed arbitrary semantic features have been experimentally confirmed by Danny Steinberg of the University of Hawaii.[15]

One objection raised by Hall,[16] and one connected with his preference for induction over deduction, is his criticism of generative grammars for starting 'from the top down', going from an initial sentence symbol to an ultimate sequence of sound symbols. Of course, in an explanatory theory the purpose of which is to match sounds with meanings, the internal direction of this mapping is quite irrelevant;[17] note for example that in some studies, such as "On Accent and Juncture in English,"[18] the mapping is from bottom to top. It is only when a generative grammar attempts to expand its scope to account for the speaker's use of his internalized linguistic system (performance) instead of only describing the system itself (competence), that the order of derivation may become of theoretical interest. The particular objection raised by Hall is that grammar which starts from the top ignores 'the relevance of phonology for the central core of linguistic structure'. It is unfortunately impossible to answer this objection from within the generative framework since it seems to be a basic and unproved axiom of descriptive theory rather than a conclusion based on observation and deduction, and is therefore unarguable within the descriptive framework and irrelevant outside it. Prerequisite to a fruitful discussion of this

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[15]Cf. Danny D. Steinberg, "Analyticity, Amphigory, and the Semantic Interpretation of Sentences", in the *Journal of Verbal Learning and Verbal Behavior*, (1970) No. 9, pp. 37–51, and also Steinberg's "Negation, Analyticity, Amphigory, and the Semantic Interpretation of Sentences", Journal of Experimental Psychology (1970), Vol. 84, No. 3, pp. 417–423.

[16]Hall, op. cit., p. 209.

[17]Cf. Noam Chomsky, "Deep Structure, Surface Structure, and Semantic Interpretation", in Steinberg and Jakobovits, "Semantics: An Interdisciplinary Reader in Philosophy, Linguistics, Anthropology and Psychology", Cambridge University Press, 1971; and also in Shiro Hattori's 60th Birthday Commemorative Volume, "Studies in General and Oriental Linguistics", Tokyo: TEC Corporation for Language and Educational Research.

[18]N. Chomsky, M. Halle, and F. Lukoff, in For Roman Jakobson, Mouton, The Hague, 1956, pp. 65–80.

point would be a definition of 'the central core of linguistic structure' and a justification of the claim that phonology is somehow relevant to it. It seems this claim is connected with the belief (p. 209) that the speaker does not know what he is about to hear, and that his interpretation of speech is totally dependent on the configuration of sounds and forms that he can perceive, and that the grammar should therefore start with sounds. There is, however, experimental evidence to show that this is only partially true; in a demonstration of what Dr. John Lilly (personal communication) has called 'the repeating word effect', a tape loop on which was recorded the word 'cogitate' was played continuously for ten minutes at a forum lecture attended by most of the participants of the 1968 LSA Summer Linguistic Institute at the University of Illinois. The audience was not informed that they were listening to the repetition of the same word, and were asked to phonetically transcribe what they heard. The results were lists of varying lengths, all beginning with transcriptions of the word 'cogitate', but including words and phrases in several languages as well as many nonsense forms, many of which had little in common other than the number of non-weak-stressed syllables and the placement of primary stress. The experiment supports the contention that people do not hear sounds directly, but rather perceive secondary interpretations of them relayed by their perceptual mechanisms, whatever they are, and that speech perception is a matter of prediction and monitoring rather than direct analysis of incoming signals;[19] and such predictions must proceed, of course, 'from the top down'. Thus the truth of the claim about 'sound → meaning' perception is far from obvious.

Another of Hall's criticisms that proceeds from a priori axioms of the descriptive paradigm is his idea of 'importance'. In several places, he has criticized generative grammar, not because it failed to account for a particular phenomenon, but because the phenomenon was given either too much or too little 'importance'. In all such cases, the objectionable items were instances of 'mixing levels', handling something, say, as a syntactic phenomenon when a descriptive grammar would have managed it as purely phonological. When Saltarelli, for example, accounts for an unusual stress pattern of an Italian word in terms of its morphological structure, Hall states that the 'importance of the phonological patterning' has been neglected.[20] In a similar instance, where a phonological irregularity has been explained in terms of non-phonological factors, Hall states that the items thus accounted for have been 'left out of consideration'![21] His claim that generative grammars consider the morpheme to be the 'most important unit'[22] also seems to have a similar basis, though it is not clear what aspect of generative grammar is being referred to. In the hypothetico-deductive framework, of course, there is no such thing as 'importance', at least not in Hall's sense; a predictive theory is a close-knit system in which every part is essential. The chain is as strong as its weakest link, and if the whole chain holds together, all the links are justified, at least until someone finds a shorter or stronger or more elegant chain. The question of whether the chain can or should be composed of sections, and of the type and number of links in each section, is determined on the basis of which arrangement gives the best chain. On the other hand, in the descriptive paradigm, this is an axiomatic choice, and consequently unarguable.

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[19]Cf. George A. Miller and Patricia E. Nicely, "An Analysis of Perceptual Confusion among Some English Consonants", *Journal of the Acoustical Society of America*, Vol. 27 (1955), pp. 338–352.

[20]Hall, op. cit., p. 212.

[21]Ibid., p. 212.

[22]Ibid., p. 211.

One of Hall's most serious criticisms is the suggestion (p. 216) that in their attempt to achieve simplicity and elegance, generativists have 'sacrificed accuracy and fidelity to detail'. At last we have a question in which the paradigms of descriptive and generative grammars agree: both require accuracy and fidelity to detail, and, assuming there is agreement as to what the facts are, any claim that the facts are incorrectly represented in either framework must be taken seriously. In this particular case, unfortunately, the answer to the charge will have to wait until Hall cites one or two specific examples of the inaccuracy and misrepresentation he refers to.

In the framework of generative grammar, one of the most telling criticisms of a rule or a proposed constraint on the form of grammars is that it loses a generality. It was this criticism that Hall used to show the undesirability of a phonemic level in phonology,[23] and which McCawley is trying to apply to eliminate autonomous deep structures from syntax.[24] This criterion of generality inevitably emerges in any attempt to write explanatory theories. Such theories are essentially compilations of generalities, of regular and predictable relationships found to hold between various elements, and the grammar which has more generalities and fewer exceptions is judged a better grammar. Exceptions are minimalized because it is embarassing for a theory that aspires to explanation to leave a large, unexplained residue. Thus Hall's statement on pages 215–16 that generative grammarians 'worship generalities' is, if not literally, then at least figuratively correct. Within a purely descriptive framework, on the other hand, no attempt is made to explain the phenomena being described, and therefore there is no reason to value the discovery of generalities. (Needless to say, in practice most structuralists *do*.) This is the reason that from a generative point of view, a descriptive grammar is essentially a list of exceptions. Since the desirability of explanation is axiomatic in the hypothetico-deductive paradigm, this again is not a matter that is arguable, except at the most fundamental level of evaluating overall paradigms.

Hall's claim that generative grammar has rejected data in favor of intuition is one that is still being repeated, and deserves some examination. In his article there are really two parts to this claim, 1) that generative grammarians do not make adequate use of linguistic studies which have been done in the past, especially of languages other than English, and 2) that the linguistic intuition of a native speaker of a language is not a proper object of scientific investigation. It is only partly true that generative grammarians have not made extensive direct use of previous descriptive studies in their work,[25] and in the cases where this criticism is well taken, the reason is clear: although structural and generative linguists are in one sense both analyzing 'language', the term is interpreted in two different ways, as a collection of transcriptions of utterances in one case and as an abstract underlying system in the other; there are equally important differences in allowable methods and constraints on the possible form of grammars. The different frameworks in which the two groups operate influences what they look for, what they find, and what they think they have found when they find it. This means that in general structuralist descriptions will not be suitable for generative studies any more than a description of Greek architecture

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[23]Morris Halle, "The Sound Pattern of Russian," Mouton, The Hague, 1959.

[24]Cf. James D. McCawley, "The Annotated Respective." Mimeo, Department of Linguistics, University of Chicago, Chicago, 1968.

[25]Cf. eg. the Bibliography of "The Sound Pattern of English", by N. Chomsky and M. Halle, Harper and Row, New York, 1968.

by an artist would be adequate for an architect or vice versa. In both cases, the artist or the architect would have to go and fill in the gaps and verify his interpretations of the descriptions himself. Hall further notes that the interest of generative grammarians has been confined chiefly to English. Again this is correct to a certain degree,[26] and again it is not surprising. If the proper object of study for generative grammarians is a native speaker's intuition, it is only logical for a linguist to describe the native intuition to which he has the most direct access, i.e. his own; and the majority of generative grammarians are native speakers of English. When Hall states that they have thrown out data in favor of intuition, it is really just a matter of definition; since generative grammar tries to characterize the speaker's knowledge of his language, and since this knowledge cannot be directly observed, inferences must be made on the basis of all available evidence, including not only what he says and what he doesn't say, but what he thinks and says about what he says and doesn't say. This does not mean that a speaker's statements about his language must be accepted uncritically; however, they are part of the data on the basis of which a theory is constructed, just as actual utterances are. The conclusion is that the speaker's role in the analysis of his language cannot be limited to being a rather passive and naive source of texts. From this conclusion, Hall (p. 217) derives a reductio ad absurdum (his term, not mine): if sophisticated native speakers are required for the analysis of a language, then before analyzing a particular language, we would have to train a native speaker in linguistics. But this would make it practically and economically unfeasible to study a large number of languages; consequently, it must not be true that sophisticated native speakers are required for linguistic analysis. Q.E.D. (Identical logic could be used to reject the hypothesis that the world is round simply because it is too expensive to make globes. This is not to say that the making of non-spherical maps should be prohibited, since globe-makers can still get much information from non-spherical maps.) Even if economical arguments were valid in theoretical discussions, generative grammar would come out ahead in cost analysis, since once a tentative universal grammar is established, field work will be a matter of checking for counter-examples in well-defined areas and listing the idiosyncracies, instead of starting from scratch every time.

The remainder of Hall's comments, at least the ones which discuss linguistics and science proper, seem to be based on several misunderstandings. For example, he criticizes generative grammarians for returning to the fallacy of traditional grammar that people speak 'according to rules'.[27] He equates the generative notion of 'well-formed' with the traditional prescriptive notion of 'correct', that is, 'in accord with pre-established rules', and states that linguistic formulations in terms of rules are only applicable to dead languages, where new, unforeseen, and unpredictable features are not possible or permissible. The misunderstanding is that although both Chomsky and Miss Fidditch talked about 'rules', they had two different sorts of things in mind. A generative 'rule' is no more intended to be a prescription than the First Law of Thermodynamics is intended to be legislation. Both are explicit formulations of supposed facts of nature, based on observations and not controlling them, and are considered successful if they can predict new observations. A similar misunderstanding is evident where Hall claims that Chomsky believes

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[26]But Cf. eg. William Orr Dingwall's listings in "Transformational Generative Grammar", Center for Applied Linguistics, Washington, 1965; Hall op. cit.; J.R. Ross, "Gapping and the Order of Constituents", PEGS Paper No. 8; T.R. Hofman, "Affixation: A New Direction in Transformational Theory", PEGS Paper No. 53.

[27]Hall, op. cit., p. 205.

that a speaker's knowledge of his language is 'inherent'. Chomsky is perhaps partly to blame for this one, since his use of the term 'competence' is one of his systematic ambiguities. Competence can mean the speaker's predisposition to learn languages, that is, his inborn knowledge of what languages are like[28] or it can mean the knowledge he eventually acquires of the structure of his own language.[29] Since a speaker has an innate potential knowledge of all languages, one might say the latter also includes knowledge of his eventual native language.

The final point of comparison which I will discuss is based partly on a misunderstanding and partly on factually incorrect claims. This is the claim that generative grammar has rejected speech in favor of written language. The misunderstanding has to do with the use of technical terms like 'rewrite'. A rewrite rule is a mathematical device which may be employed in the formal 'calculus' which a linguistic theory must contain, regardless of whether the theory attempts to account for spoken *or* written language. To say that a theory using rewrite rules must be about written language would be like saying that a theory using differential equations must be about automobile axles.

The factually incorrect part of Hall's criticism is connected with the old idea[30] that the spoken language is somehow primary, and that "reading and writing are in every respect secondary derivatives thereof". Obviously this must be true in a historical sense; there must have been language before there was writing of language. Synchronically, however, written and spoken language are closely connected but distinct systems, separately learned with each having its own separate and autonomous structure. Although both systems have a common core, there is probably never a one-to-one mapping, and it is certainly never true except possibly during the first generation after the creation of the script that the written system is a sub-system included within the system of the spoken language. In special cases, such as dialogue in novels, the written language may match the spoken quite closely, and on certain types of formal occasions spoken language may be almost isomorphous to written language, but these are abnormal situations and are recognized as such by speakers and readers. Quotation marks, the special symbols used to introduce spoken language into written texts, are also used to mark exclamations, cries of pain, bird imitations, utterances in foreign languages, and other extra-systematic elements inserted in the text. While speech and written language may often have a number of common characteristics, they can also diverge to the point of almost total independence of each other; examples might be medieval written Latin as opposed to the spoken languages of the people who wrote it, or classical Chinese with its own vocabulary and grammar quite different from the vocabulary and grammar of any of the dialects of the people who used it, and with no independent phonological system of its own at all.

Of all the points raised in Hall's article, one of the most difficult to understand and answer is the statement that generative grammar has rejected the hard-won independence the field had achieved, and has accepted subservience to other fields. This point is difficult to understand because it is hard for generative linguists to imagine why any scientific field should want to be independent of other sciences, or just what it means for one science to be 'subservient' to another. The origin of this concept of 'independence'

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[28]Cf. Hall's 'capacity', p. 219.

[29]Cf. Hall's 'competence', p. 219.

[30]Ibid., pp. 213–14.

is not clear; it is compatible with the descriptive paradigm, but it does not seem to be logically a necessary part of it. It can certainly have no place in explanatory science, since the object of explanatory science, 'nature', is a continuum, and any expedient division of labor in the task of explaining natural phenomena must be an arbitrary one. This must also be true of linguistics, unless we are to assume that the phenomenon of language is an exception to natural laws; while this possibility cannot be ruled out a priori it can also not be accepted as an initial axiom. Something is listed as an exception only after all attempts to make generalizations about it have failed. Perhaps when it was found that descriptive linguistics did not fit into the framework of sciences operating within the explanatory paradigm, the resultant isolation may have come to be looked on as a desirable end in itself, more in accord with the criterion of empirical objectivity. It was apparently such a position that eventually evolved into Hall's picture of linguistics as a besieged castle bravely defended by the structuralists on the ramparts while the treacherous and ungrateful Chomskyites let in the ferocious philosophers and murderous mathematicians through a secret gate.

The structuralist-generativist dialogue, or lack of it, has not always been conspicuous for its dispassionate and scholarly objectivity. This article itself is not immune from such tendencies, as the reader may have noticed. Hall has devoted part of his article to a discussion of the personal and emotional factors involved in some confrontations, and has exemplified them frequently throughout his article. Such matters do not strictly belong in a comparison of two views of the nature of linguistic science, but since they are so important in their effect on communication between the two groups, and since Hall has made a number of comments on the situation from his point of view, perhaps it would not be inappropriate for me to add some observations.

On page 222 of his article, Hall characterizes most linguists espousing the generative approach as falling into one of three groups, which we might somewhat facetiously label 1) the Sour-grapers, 2) the Goof-offs, and 3) the Fifth-Columnists. The first class, the Sour-grapers, is composed of people who began their study of linguistics under a structuralist 'maestro' and later became disappointed and switched rather than fight. The second class, the Goof-offs, were people who were interested in language and linguistics, but not enough to be willing to 'undergo the required extensive training and learn the arcane terminology and symbolism'; they saw in generative grammar a 'royal road to learning', in Hall's terms. The Fifth-Columnists were 'a flood of untrained newcomers' who came into linguistics from fields such as computer-technology, philosophy, psychology, and mathematics. They entered linguistics with the intent of subverting it and taking it over. It is helpful to be offered such an objective classification system from an external observer who places such a high value on impartial observation as a matter of principle. It is sometimes difficult for persons closely involved in an activity to step back and see themselves as others see them. The only observation I would add is that these categories are perhaps not mutually exclusive; to cite a personal example, I entered Linguistics with a BA in Physics, which would seem to place me in group three, the Fifth-Columnists. (I am not sure how I would react if Physics declared war on Linguistics, but fortunately no secret agent of cryogenics has approached to test my loyalty.) My first four years of linguistics were almost entirely structuralist in orientation, and thus I should also be qualified for membership in group one, the Sour-grapers; yet I don't recall feeling any disappointment with any of my early professors, persons like Murray Fowler, the man who helped me get into this fascinating business, and Martin Joos, my first teacher, who made me see how fascinating it really could be. Perhaps my place is rather in the ranks of

the Goof-offs; I confess that after my first strong exposure to generative grammar, I was no longer so enthused about the prospect of attacking languages from the phonetics end and pretending that I couldn't see what was going on in the morphology and syntax, which was to be saved for dessert. The man who can observe such a spartan program is made of sterner stuff than I. I suspect that what is really needed to make Hall's taxonomy of generative grammarians workable is a set of rigorous discovery procedures.

There are certain attributes which Hall finds tending to occur in all three groups, including 'self-advertising clamor and aggressiveness', 'arrogance' and 'insolence.'[31] Hall's apparent definition of the latter terms seems to be as follows: arrogance describes a person who stubbornly insists he is right after being told he is wrong, and insolence is apparently a term used to characterize persons who question one's authority. I am personally acquainted with a number of generative linguists, and in most cases I don't believe they are intentionally arrogant or insolent; but in a situation where a new scientific paradigm is being presented as an alternative to an older one, and the adherents of the newer paradigm tend to be younger than the adherents of the old one, it sometimes happens that the younger scientists, the 'revolutionaries', are forced into the position of either denying their principles or appearing 'aggressive', 'arrogant', or 'insolent'. While this is not necessarily the explanation in all such cases, it would probably still improve matters considerably if adherents of the older paradigm would try to have a bit more respect for the opinions of their 'revolutionary' colleagues, and not force them into this uncomfortable position.

In conclusion, it seems to me that while it is a bit too early to talk about bringing all the world's linguists around to one point of view as to what science is, we can make some steps in that direction; one such step would be for each linguist to decide exactly what his principles of linguistic analysis actually are in practice. It is likely that both groups will find they are not as far apart as they thought they were. A second step would be to avoid the use of such terms as 'taxonomist' and 'Chomskyite', which have come to be felt as pejorative by some, and can only serve to further polarize the two schools of linguistics. A third step toward reunifying linguistics is one suggested by Hall's article: let each school make out a 'shopping list' of devices and approaches in the other framework which it might find useful in its own, and adapt and modify them to fit. Thus, Hall would like to 'salvage' transformations from generative grammar,[32] though they mean something to him which is quite different than the generative conception of them. Let the generativists learn from the descriptivists about methods of initially approaching a new language in the field; to be sure, generative grammarians are not concerned about discovery procedures, but it is a rare linguist who can come up with an explicit and testable generative grammar of a language without getting his hands a little dirty collecting and analyzing texts and discreetly trying to find out what the informant *really* knows about his language. The final step, and the point of this whole paper, is for each linguist to realize that his goals of linguistic analysis are not necessarily everyone's goals, and avoid criticizing other linguists for failing to meet his own personal criteria. Let us not criticize a penguin for not being an armadillo, but rather ask if it is an adequate penguin. The question of whether a penguin is an inherently better animal than an armadillo, if it is a meaningful question at all, can wait for a while.

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[31] Ibid., pp. 223–24.

[32] Hall, op. cit., p. 227.