as non-subject; such a 'noun' could not be misinterpreted as an independent clause subject of the following subordinate verb. When noun inflections were lost from the language this confusion could arise: such sentences became perceptually complex and the restriction on subject relative pronoun deletion was extended to relative pronouns modifying nouns in all positions.[8]

In this example the scope of the particular optional (or 'stylistic') rule that deletes relative pronoun modifiers was modified according to the perceptual habits of the child. This exemplifies how the relative dependence of the child on perceptual strategies of speech constrains the form of structural grammars which are learned. It is obvious that a grammar could not be learned in which every sentence is ambiguous with respect to its internal structure. Similarly, a grammar in which every sentence violated universal perceptual principles could not be learned. But existing grammars do contain sentences *some* of which are ambiguous, and *some* of which strain general perceptual principles. We cannot restrict the universal form of a possible grammar in any way except to say that sentences which it predicts must be, *in general, perceptually analysable.* Surely the notion of relative perceptibility must be measured *vis-à-vis* the actual use of the language and the properties of the child's cognitive structure rather than be reference to 'structural universals of the grammar of a language'. Accordingly, certain universal features of linguistic grammars are due to laws governing their actual use by young children and adults. The fact that the child is simultaneously acquiring a structural grammar and systems for speech production and perception leads to a view of language learning and corresponding principles of linguistic change and linguistic universals which emphasises an interaction between the different systems of language use. Since language learning includes the simultaneous acquisition of perceptual and grammatical structures, the ultimate structure of the grammatical system is partially a function of two kinds of simplicity: simplicity of the structural system itself, and simplicity of the systems for speech perception and production.

It remains for further research to show what perceptual constraints interact with the syntax of non-Indo-European languages. The mechanisms of speech production and, even more important, of structural learning will undoubtedly be shown to have profound effects on the kinds of structures which languages exhibit. I have concentrated on English because we have done little work with other languages. I have concentrated on the effects of the *perceptual* mechanism in syntax because we understand nothing about the mechanisms of language

acquisition and speech production. Since we are at the beginning of our investigations I urge the reader to take our examples with a dose of salt; future research will indicate most of the specific claims made here to be superficial and incorrect. But there is no doubt that such interaction between speech behaviour and linguistic structure occurs continuously and is the main source for the life and evolution of every language.

D. Conclusion

One common thread in this volume is a wariness of the monolithic tendencies of the recent revolution in the study of language: each author discusses some particular way in which structural properties of language should be embedded within other systems of language and cognition. I have argued that the concept of language behaviour is like the concept of a particular species—a complex of interacting systems, primarily the systems of speech perception, speech production and speech structure. Such subsystms *mutually* influence each other's internal structure; accordingly, *no* system is more central or explanatory than any other. In this chapter I have presented a sample of theoretical, experimental and historical approaches that can be used to explore the interactions of these behavioural subsystems of language.

There are two conclusions from this view of the study of language. First we must be much more careful than in the recent past to study the nature of our intuitions about sentences. It will not do to multiply formal 'levels' or apocalyptically to attack each others' theories every time a new kind of intuition appears on the horizon. We must first make sure that we understand its nature and its interaction with other sets of intuitions. Not only will this solidify the factual basis of linguistic description, it may offer some understanding of how further to develop experimental phenomenology.

The final point bears on the question of nativism in language and the relation of human language to more primitive communication systems. Nobody in command of his faculties can deny that language is innate in some sense, just as it is innate to a monkey to have digital opposition. But the study of homologues in allegedly primitive forms of advanced behaviour only confuses the problem. Consider the uselessness of comparing the monkey's capacity to hang by his fingers, with his capacity to hang by his elbow and by his prehensile tail. Similarly, evolutionary analogues are equally spurious: one does not seek the explanation of what is uniquely innate in a modern horse by 'subtracting out' what was innate to an *eohippus*. Each species is a

coherent organism with its own interacting organisational systems; these interactions necessarily modify and mutate whatever innate structures are shared with earlier related species. Given that all behavioural systems naturally interact within a species it is not clear that one can compare two intact species to isolate what structure is unique to one of them (see Campbell, Chapter 1). Nor can one treat 'structure of language' as independent of the 'structure of cognition' (see McNeill, Chapter 3) since both structures determine certain aspects of each other.

Accordingly, it is not at all clear that homologues of communicative behaviour in non-human animals constitute a basic behavioural substrate on which human language rests. Nor is it clear how the basic perceptual, cognitive and social mechanisms internal to humans independent of language are organised by language behaviour itself. We do not face a problem of describing *what* is innate in human language, either by reference to related dumb species or to the linguistic role of non-linguistic aspects of human cognition. Rather, our problem is to specify *how* the child's desire to communicate recruits and organises human capacities into the species of behaviour that we know has 'language'.

Footnotes

[1] I am indebted to J. Limber for calling my attention to this particular construction.

[2] Notice also that the surface phrase structure difference in these cases is also reflected in an internal structural difference. Mehler and Carey found that such differences did not form an effective perceptual set if they were not also reflected in surface structure differences.

[3] These examples are only intended to give the reader an idea of the *kind* of processes involved in English stress assignment. The reader should consult Chomsky and Halle for a full treatment of the problem.

[4] Note that the finding that phrase structure is not ordinarily assigned as an initial step in sentence perception is further evidence against the

standard "analysis-by-synthesis" model of speech perception. According to that model, the goal of the synthetic component of perception is to generate a "match" of the surface phrase structure of the sentence which is allegedly already computed. The evidence reviewed here suggests that the surface phrase structure is often never fully computed in perception either as the first *or* the final step.

[5] The pseudo-passive transformation (56) was not discussed in print by Chomsky, to my knowledge. However, the analysis of sentences such as (61c) as derived from passives by a rule like (56) is consistent with the syntactic theory as presented in *Syntactic Structures* (and was discussed in classes by Chomsky in 1961). This analysis was later rejected because of the meaning differences between sentences like (61b) and (61c), on the view that sentences with different meanings cannot have different underlying internal structures. However, Chomsky's current arguments (1970) that certain aspects of semantic interpretation depend on surface structure would allow for deriving (61c) from (61b), with meaning differences accounted for by surface structure interpretive rules.

[6] The arguments against the analysis in (61) presented here are stimulated by Postal's work, although the reader should credit Postal with the correct arguments and the author with the incorrect arguments. The main point of the present discussion is to explore the kinds of linguistic arguments there are against the analysis in (61) and in favour of an analysis like that of (68).

[7] At least for the interpretation of (61a) which is synonymous with (61c). The difficulty with these cases is that (61a) is ambiguous, meaning either the same as (61b) or the same as (61c). This suggests that there are two possible analyses of sentences like (61a, ba c).

(61a)—Base$_j$, number and tense
(61b)—Base$_j$, passive, number and tense
(61c)—Base$_j$, number and tense

(61a)—Base$_i$, exchange, number and tense
(61b)—Base$_i$, exchange, passive number and tense
(61c)—Base$_j$, number and tense

On either analysis 'pseudo-passives' (61c) are simpler transformationally than passives (61b), which directly conflicts with the analysis in (61). In the reported experiments the verbs used were not 'cognitive' like *interest* but impersonal like *dry*. A sample set of sentences corresponding to 61a, b, c is: (a) the sun dried the raisins; (b) the raisins were dried by the sun; (c) the raisins dried in the sun.

[8] For the purposes of the present discussion the loss of inflections is left unexplained. See Bever and Langendoen (1970) for further discussion.