NEO-DARWINIAN ACCOUNTS OF THE EVOLUTION OF LANGUAGE: 1 QUESTIONS ABOUT THEIR EXPLANATORY FOCUS*

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1 A matter of substance

The neo-Darwinian theory of natural selection, it is generally considered, offers the only adequate conceptual framework for explaining the evolution of complex biological structures.[1] On various recent conceptions of language, moreover, human language is to be taken to be just such a biological structure.[2] So it is not really surprising that an increasing volume of work is aimed at constructing neo-Darwinian selectionist accounts of the evolution of language in the human species.[3] And, indeed, engaging in this work is potentially profitable in at least two broad ways. It could, for one thing, lead to a better understanding of the beginnings of language, a matter that has baffled scholars for centuries. For another, it could yield important new insights into a range of nonevolutionary aspects of language. Thus, it has become increasingly clear that, in order to develop good selectionist accounts of the evolution of language, a better understanding is required of amongst others:

1a the diverse functions of language,

b the way in which form (or structure) and function are interrelated in language,

c the apparent functionlessness of fundamental structural features of language,

d the nature and sources of various kinds of linguistic complexity,

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e tradeoffs of utility within language in the case of a conflict between speakers' concerns and hearers' concerns,

f the ways in which superficial linguistic diversity may manifest underlying linguistic unity,

g the categorical nature of linguistic rules, and

h the specifics of substantive linguistic universals.[4]

Work that yielded new insights into the evolution of language would undeniably be of a highly significant sort. But, to date, how much have proposed selectionist accounts contributed in fact to our understanding of the evolution of language? And, what is more important, how much can such accounts contribute in principle to our understanding of the evolution of language? On these questions, leading scholars' views diverge quite sharply.

Noam Chomsky, for instance, has more than once expressed serious reservations about the 'substance' of selectionist accounts of the 'development' of the human language faculty. In one of the strongest statements of these reservations, he (1972:97-98) remarks that:

> 'It is perfectly safe to attribute this development [of the innate component of the human language faculty --- R.P.B.] to "natural selection", as long as we realize that there is no substance to this assertion, that it accounts to nothing more than a belief that there is some naturalistic explanation for these phenomena ...'[5]

Daniel Dennett (1995a:389), by contrast, has recently asserted a very different view:

> 'Many linguists and biologists have tackled the problem of the evolution of language [within a neo-Darwinian selectionist framework --- R.P.B.], using the

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> same methods that have worked well on other evolutionary puzzles, and getting results, or at least what seem to be results.'

The upbeat tone of this assessment by Dennett echoes that of Steven Pinker and Paul Bloom's (1990:727) judgement that

> '... there is a wealth of respectable new scientific information relevant to the evolution of language [by natural selection --- R.P.B.] that has never been properly synthesized ... [making us --- R.P.B.] optimistic that there are insights to be gained, if only the problems are properly posed.'

Richard Lewontin, in turn, has expressed strong disagreement with this judgement by Pinker and Bloom. His critique of Pinker and Bloom's synthesized account of the evolution of language (outlined in par. 2 below) he closes, for instance, with the following sceptical, if not cynical, words:

> 'And finally, to repeat my first problem, how much change in the brain really had to take place to make linguistic competence, and how many independent neurodevelopmental changes were needed? Does anyone know? The fact that they do not and often cannot know the basic facts on which the theory rests does not seem to deter academics [such as Pinker and Bloom --- R.P.B.] from presenting speculations as if they were well founded. Fish gotta swim, birds gotta fly, people gotta talk and academics gotta write.' (Lewontin 1990:741)

Which of these scholars are we to believe? The Chomskys and Lewontins? Or the Pinkers and Blooms, and the Dennetts?[6] Or perhaps neither side has got it exactly right? Indeed, in principle, just how good can a selectionist account of the evolution of language be?

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This is the general question that I will be pursuing in the present paper and a number of subsequent ones. To do so, I will examine some of the conceptual means that have been used for constructing and appraising what are considered to be good selectionist accounts of the evolution of (features of) language. These conceptual means include the following:

2a fundamental assumptions about language and also fundamental assumptions about natural selection and about other mechanisms of evolution,

b methods used, or to be used, in investigating the evolution of language, and

c forms of argument, conditions of evidence and other criteria of adequacy used, or to be used, in the construction and appraisal of selectionist accounts of the evolution of language.

Obviously, the merits of a selectionist account of the evolution of language will depend to a considerable extent on the appropriateness and well-foundedness of the conceptual means on which it draws. Specifically, should these means display serious limitations, the selectionist accounts using them could not but reflect these limitations.

In the present paper, I will focus on the use of these conceptual means by the discussants of Pinker and Bloom's selectionist account of the evolution of language in *Brain and Behavioral Sciences* (BBS 13, 1970 and BBS 17, 1994). There are various reasons for according this account a special status. First: it represents a synthesis of some of the best work done up to 1990 within a neo-Darwinian framework on the evolution of language. Second: its relative sophistication has drawn favourable comments both from supporters and from critics of Pinker and Bloom's account. These comments include the following:

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'In their remarkably well-written essay, based on a wealth of sources from many disciplines, Pinker and Bloom (P&B) offer a novel and sophisticated version of adaptationism.' (Piattelli-Palmarini 1990:752)

'Pinker and Bloom (P&B) have defended a selectionist account of language. The thoroughness with which they have done so is most welcome ... I applaud P&B's account for its sophistication and persuasiveness.' (Catania 1990:729)

'The minor disagreements I have with Pinker and Bloom's (P&B's) admirable target article are trivial and beneath mention ...' (Ridley 1990:756)

'That is why the target article is such a keen pleasure to read. P&B have found their way through a briar patch of rhetorical obfuscation to an impeccable understanding of modern Darwinism ... P&B's central contention seems inescapable.' (Tooby and Cosmides 1990:761)

Third: the structured format of the BBS discussion --- a target article by Pinker and Bloom, followed by commentary by some thirty three 'peers', followed by a response from Pinker and Bloom --- makes it one of the better-focused discussions of the topic in question. I examine the BBS discussion not so much to appraise the ideas and arguments of the individual participants in it as, rather, to determine what that discussion reveals about the merits and limitations of the conceptual means used in the construction, criticism and defence of a relatively sophisticated selectionist account of the evolution of language. In subsequent papers I hope to extend my examination to other accounts of the same sort.

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2 Pinker and Bloom's selectionist account

The gist of the selectionist account offered by Pinker and Bloom (henceforth 'P&B') of 'the evolution of the language faculty' (1990:708) is that 'human language is the product of Darwinian natural selection' (1990:708). They (1990:708) characterize natural selection as the 'differential reproductive success associated with heritable variation'.[7] Central to P&B's selectionist account are the following four composite claims:

3a Language shows a complex design for carrying out a function which is reproductively significant.[8]

b Neo-Darwinian selection is the only explanation for such complex design or adaptive complexity.

c The nonselectionist accounts of the evolution of language so far proposed are seriously flawed.

d The required additional postulates about the actual process by which language has evolved are rather plausible.

As we proceed, it will become clear that 3a - d can be broken down into a number of more specific claims. Taken as a whole, P&B's selectionist account moreover presupposes fundamental additional assumptions, including the following:

4a Language is a specialized biological structure or trait.

b The conceptual means available for the construction and appraisal of selectionist accounts of the evolution of language are adequate for the purpose.

These assumptions, too, will be considered in some detail in the present and subsequent papers.

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Claims 3a - d derive their substance from what P&B (1990:727) call 'a wealth of respectable new scientific information relevant to the evolution of language that has never been properly synthesized'. Fleshing out this point, they (1990:727) assert that

> 'The computational theory of mind, generative grammar, articulatory and acoustic phonetics, developmental psycholinguistics, and the study of dynamics of diachronic change could profitably be combined with recent molecular, archeological, and comparative neuroanatomical discoveries and with strategic modeling of evolution using insights from evolutionary theory and anthropology.'

In short, the status of P&B's selectionist account of the evolution of language is that of a 'synthesized account'.[9]

3 Ontological determinacy

Which brings us to a first fundamental condition of adequacy which has to be met by selectionist accounts of the evolution of language: the condition of ontological determinacy. This requires such accounts to clearly specify:

5a the particular linguistic object(s) whose evolution is at issue;

b either that it is this/these object(s) as (a) whole(s) whose evolution is at issue or that it is only certain individual characteristics of this/these object(s) whose evolution is at issue; and

c those particular phase(s) in the evolution of this/these object(s)/characteristics which is/are at issue.

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In order to specify 5a, a selectionist account has to explicate the ontological import of the concept of 'language' it adopts. This explication has to be given within the framework of a linguistic ontology which is both clearly articulated and well-founded. Otherwise it would be an exercise in arbitrary and ad hoc stipulation. 5c requires an explication of the same sort of the concept of 'evolution', an explication which draws a properly motivated distinction between different phases in the evolution of biological structures.

In a selectionist account of the evolution of language that failed to meet the condition of ontological determinacy, the explanatory focus would be blurred: such an account's claims about the 'evolution' of 'language' would be insufficiently specific in regard to empirical import. As a result, these claims would be hard to justify or appraise. Of course the condition of ontological determinacy seems so obvious or elementary that it is difficult to imagine how any selectionist account could fail to mind it and meet it. And yet a close inspection of the BBS discussion yields reasons for questioning the ontological determinacy of even a relativey sophisticated selectionist account such as P&B's.

4 'Language vs. the language faculty'

Consider the following remarks by P&B (1990:708):

> 'It would be natural, then, to expect everyone to agree that human language is the product of Darwinian natural selection.'
>
> 'We will argue that there is every reason to believe that language has been shaped by natural selection as it is understood within the orthodox "synthetic" or "neo-Darwinian": theory of evolution (...). In one sense our goal is incredibly boring. All we argue is that language is no different from other complex abilities such as

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echo-location or stereopsis, and that the only way to explain the origin of such abilities is through the theory of natural selection.'

In these remarks, P&B use the term (*human*) *language* to identify the object for whose evolution they propose a selectionist account. They also, however, seem to use several other terms and expressions for the same purpose. Here are some examples:

- *the (human) language faculty*

  'Many people have argued that the evolution of the human language faculty cannot be explained by Darwinian natural selection.' (P&B 1990:707)

  'But accounting for the evolution of a language faculty permitting restricted variation is only important on the most pessimistic of views.' (P&B 1990:715-716)

  'In the evolution of the language faculty, many "arbitrary" constraints may have been selected simply because they defined parts of a standardized communicative code.' (P&B 1990:718)

- *the language acquisition device*

  'More generally, these considerations suggest that a preference for arbitrariness is built into the language acquisition device at two levels.' (P&B 1990:718)

- *universal grammar*

  'Does universal grammar in fact show signs of adaptive complexity?' (P&B 1990:773)

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- *grammar(s)*

  'Evolutionary theory offers clear criteria for when a trait should be attributed to natural selection: complex design for some function, and the absence of alternative processes capable of explaining such complexity. Human language meets these critera: Grammar is a complex mechanism tailored to the transmission of propositional structures through a serial interface.' (P&B 1990:707)

  'A more serious challenge to the claim that grammars show evidence of good design may come from the diversity of human languages ...' (P&B 1990:715)

  'The nature of language makes arbitrariness of grammar itself part of the adaptive solution of communication *in principle*' (P&B 1990:718)

- *the cognitive mechanisms underlying language*

  'Do the cognitive mechanisms underlying language show signs of design for some function in the same way that the anatomical structures of the eye show signs of design for the purpose of vision?' (P&B 1990:712)

- *the computational mechanisms underlying the psychology of language*

  'Our own arguments spring from the adaptive complexity of the computational mechanisms underlying the psychology of language as it is currently understood.' (P&B 1990:766)

- *the ability to use a natural language*

  'This list of facts ... suggests that the ability to use a natural language belongs more to the study of human biology than human culture ...' (P&B 1990:707)

Formulations such as these give rise to questions about the identity of the object(s) for whose evolution P&B are offering a selectionist account. Are expressions such as *(human) language*, *the (human) language faculty*, *the language acquisition device*,

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universal grammar, *grammar(s)*, *the cognitive mechanisms underlying language*, *the computational mechanism underlying the psychology of language* and *the ability to use natural language* intended to denote the same object or different objects? Which exactly is/are the object(s) for whose evolution P&B are offering a selectionist account?

P&B neglect to address any such questions explicitly. Which is puzzling, since they do seem aware of the importance of drawing clear ontological distinctions and of reflecting these in unambiguous terminology. For instance, in commenting on the shortcomings of certain evolutionary accounts produced in sociobiology, P&B (1990:766) remark as follows:

> 'The main flaw in many applications of sociobiology to human psychology is that their proponents do not focus on cognitive and emotional *mechanisms*, which are the proper subject for studies of adaptive complex design, but on particular *behaviors* (such as female infanticide) or on folk-psychological personality *traits* (such as "indoctrinability"), which are far too superficial and variable for such studies....'

So why is it that scholars who insist on distinguishing (i) 'cognitive and emotional *mechanisms*', (ii) 'particular *behaviors*' and (iii) 'folk-psychological personality *traits*' refrain from drawing a clear distinction between 'language' and 'the (human) language faculty', between 'language' and 'the cognitive mechanisms underlying language', between 'language' and 'the ability to use natural language'? Is it because they adopt a linguistic ontology in which these expressions denote one and the same object?

Let us explore these questions further by focusing on P&B's use of the expressions *language* and *the (human) language faculty*. Their target article contains passages in

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> nonadvantageous) character of properties of language, however, don't automatically carry over to properties of the language faculty itself, and, of course, it is the language faculty, rather than languages or grammars, that should be explained in terms of biological adaptation and selection. P&B tend to extrapolate tacitly and uncritically from language to language faculty, with some questionable results.'

In support of his general point, Sperber (1990:757) argues that linguistic diversity, for example, may be a nonadvantageous property of 'language'. It may not only be 'compatible with' the underlying 'language faculty', however, but may even follow from the 'good design' of this faculty. Moreover, Sperber (1990:757) argues, P&B's extrapolation from 'language' to the 'language faculty' causes them to underestimate the difficulty which is posed by describing as an adaptation a mutation that is advantageous only within a population where it is widely shared.

Ninio (1990:746), likewise, contends that P&B in their target article subscribe to two 'mutually exclusive conceptions of language':

> '.... the most salient feature of this rich and complex target article is the evidence of a tension between two mutually exclusive conceptions of language. On the one hand, Pinker & Bloom (P&B) appear to subscribe to a view of language as a communicative code, inherently dependent on the existence of conventions shared among a group of people, an interpersonal rather than a private system of knowledge (sect. 3.1). On the other hand, they also see language as a genetically fixed, individually owned property of an organism ...'

Ninio (1990:746) argues that the above-mentioned tension leads to 'several ambiguities and inconsistencies in the evolutionary theory' presented by P&B. In fact, she charges,

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this theory 'actually consists of two mutually contradicting versions'. In version A it is 'language itself' that is claimed to have undergone evolution by natural selection. In this version 'natural selection started to operate on the human language faculty from the initial grammarless moment, so that all development of language is itself simultaneously a development of the innate grammar'. In version B, Ninio (1990:746) claims, 'what is evolving is the portion of all existing grammatical rules set genetically in individuals, when language itself is constant'. In this version, on her reading, 'natural selection started to operate on a full-blown language and has consisted only of the gradual genetic fixing of grammatical knowledge ...'

Lumping Sperber's and Ninio's criticisms together, P&B (1990:776-777), however, reject the 'suggestions' of both:

> 'Contrary to the suggestions of **Ninio** and **Sperber**, there are no paradoxes, or confusions between language and the language faculty, in such an argument.'

The 'argument' to which P&B refer concerns involving the Baldwin effect in explaining how innate grammatical mechanisms might have developed gradually from communication systems which were originally supported by general cognitive processes.[10] The reason why there are no such confusions or paradoxes, according to P&B (1990:776), is that:

> If some people are using a grammatical construction (either because of a special genetic property or general cognitive talents), there could be an advantage in others' evolving to be able to process it automatically, with dedicated hardware, as opposed to conscious inferential reasoning ... Moreover, a genetic change in the language faculty need not simply generate the ambient language verbatim in which case ease of processing would be the only selection pressure, and further

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> evolution would halt. It can generate a superset of the language (or a partially overlapping set), much the way contemporary children go beyond the information given in the development of creoles, sign languages, and their frequent creative inventions. If such creations increased expressive power and were comprehendable by others by any means, it could set the stage for the next iteration of the evolution process'.

What is interesting about this response is that P&B do not argue that the distinction between 'language' and 'the language faculty' invoked by Sperber and by Ninio is purely terminological, or obscure, or flawed in some other way.[11] Moreover, P&B seem to agree, in principle 'language' and 'the language faculty' can be confused as the explanatory target of a selectionist account in a way that would reflect negatively on such an account. And they go on to introduce the notion of 'the ambient language' into the discussion, without explicitly clarifying its ontological import vis-à-vis that/those of the concepts of 'language' and 'the language faculty'. Potentially, the argument between P&B on the one hand and Sperber and Ninio on the other hand is significant in at least two ways: firstly, it concerns the specificity and appropriateness of the focus of P&B's selectionist account; secondly, it concerns the soundness of some of the inferences drawn by P&B. In fact this argument lacks substance, however, since (i) it turns on what is a fundamental ontological distinction --- that between 'language'/'the ambient language' and 'the language faculty' --- and since (ii) this distinction is explicitly drawn within a well-articulated linguistic ontology neither by P&B nor by Sperber or Ninio .

Could it be that the distinction between 'language' and, specifically, 'the language faculty' is so evident or unproblematic that there is no need for drawing it explicitly (once again)? Not really. To see this, let us consider how this distinction could, or could not, be drawn within the framework of one of the most clearly articulated linguistic ontologies yet proposed, namely Chomsky's.

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As conceived of by Chomsky, the language faculty is a 'mental organ' or 'module of mind' and, as such, has two states that are of special significance.[12] One of these significant states of the language faculty is the initial state, taken by Chomsky to be 'genetically determined'.[13] That is to say, Chomsky sees the initial state of this faculty as incorporating the 'genetic language programme', or '(the set of) genetically encoded linguistic principles'; this, in turn he sees as representing the child's innate linguistic endowment. The language faculty is in its initial state in a child that has not had any linguistic experience *in the sense of having been exposed to utterances of or data about* his/her language.[14] The other significant state of the language faculty is an attained, and stable, state.[15] This state develops or grows out of the initial state under the 'triggering' and 'shaping' influence of the child's linguistic experience.[16] It is this development or growth that has conventionally been called 'language learning' or 'language acquisition'. And it is the attained, and stable, state of the language faculty that incorporates what Chomsky has characterized as 'knowledge of a language'.[17]

So, within Chomsky's linguistic ontology, to which the language faculty as characterized above is central, what would language or a language be? Chomsky has considered this question with reference to a language. On the one hand he identifies a language with a system of knowledge of language which, in turn, he takes to be a specific attained stable state of the language faculty. He (1988a:36) comments, for example, that:

> 'The language ... constitutes one of the many systems of knowledge that the person has come to acquire, one of the person's cognitive systems.'[18]

On the other hand, Chomsky (1988b:21) draws a distinction between 'knowledge of language' and 'the object of knowledge':

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> 'Taking knowledge of language to be a cognitive state, we might construe the "language" as an abstract object, the "object of knowledge", an abstract system of rules or principles (or whatever turns out to be correct) that is an image of the generative procedure, the I-language, represented in the mind and ultimately in the brain in now-unknown "more elementary" mechanisms.'[19]

Yet he (1988b:21) sounds a warning about this further step of construing 'language' as an abstract object:

> 'Since the language in this sense is completely determined by the I-language [i.e., by an attained state of the language faculty --- R.P.B.], though abstracted from it, it is not entirely clear that this further step is motivated, but perhaps it is.'

The question, then, is whether anything of substance can be claimed about 'an abstract(ed) language' that cannot be claimed about the state of the language faculty from which it has been abstracted. Chomsky offers no examples of claims that apply to 'an abstracted language' but not to the state of the language faculty from which it has been abstracted. Nor does he provide for a separate theory that would express claims about 'an abstracted language' only.[20] In sum: it is doubtful, rather than definitely clear, that a Chomskyan linguistic ontology allows a distinction to be drawn between a language and a specific attained state of the language faculty.

So what does this imply about the ontological status of language, as distinct from a language? In other words: what could language be, given Chomsky's conception of the language faculty? An obvious possibility is to consider language to be an abstracted object too: specifically the entity abstracted from the initial state of the language faculty. But could language in such a sense be something that was not 'completely determined' by the initial state of the language faculty? In other words, again: could there be, distinct

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from a domain of 'truths' about the initial state of the language faculty, an additional domain of fact about language as an abstracted object? Moreover, would such an object be a biological object in a conventional sense: that is to say, an object that could have evolved by natural selection? Is there a distinct domain of fact about the evolution of language which is not a domain of fact about the evolution of the initial state of the language faculty as well? These are examples of the questions that would have to be addressed by a Chomskyan ontology that drew a distinction of substance between language and the initial state of the language faculty. Similar questions would have to be raised and faced by P&B's ontology, should it differ in significant ways from Chomsky's. To my knowledge, P&B have not addressed questions such as these. If they were to adopt the fundamental distinctions drawn in the Chomskyan ontology, it certainly would not be possible for them to identify language with the language faculty, as opposed to the initial state of this faculty.[21]

Of course, the condition of ontological determinacy applies equally to criticisms of proposed selectionist accounts of the evolution of language. In particular, such criticisms are devoid of substance if they are based on a linguistic ontology that is in crucial ways obscure or arbitrary. In the BBS discussion, various of P&B's critics do draw on a suspect ontology. Sperber and Ninio for example, as we saw above, base their criticisms on an obscure distinction between 'language' and 'the language faculty'. Another critic of P&B's who proceeds in this way is Jennifer Freyd (1990:732), where she suggests that:

> '... P&B fail to distinguish adequately *language* --- the public, shared system multiple humans create over time --- from the human *language faculty* --- the mental mechanisms that support the ability to acquire and use language.'

Freyd contends that 'the language faculty' must have evolved through natural selection. But 'language' as a 'public shared system' --- or 'external language structure' --- could

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not have done so. For, on Freyd's (1990:733) view, 'shared knowledge evolves at a much faster rate than our genetic code', and, consequently, cannot be 'fully predicted from our genetic code'. The evolution of 'shared knowledge' cannot be 'fully understood through an analogy to physical evolution', moreover, since it does not 'evolve through sexual reproduction'. Freyd's criticisms spring, however, from a questionable distinction 'language as a public shared system/external language structure vs. the human language faculty vs. the ability to acquire and use language'.

First, there are serious problems with the well-foundedness of notions of 'shared language', as Chomsky (1989:9-10) has argued. In general, he sees no use for a notion of 'shared language'. As he (1989:9) puts it:

> 'For the inquiry into the nature of language, or language acquisition and change, or any of the topics of linguistic inquiry, the notion would appear to have no use ... [not] even for sociolinguistics, if we treat it seriously.'

And, in regard to specifics, Chomsky has illustrated the flawed nature of the 'logic' of Dummett's notion of 'shared language' by inviting his readers to consider the fact that Jones understands Smith when the latter uses the word 'tree' to refer to trees. Chomsky (1989:10) argues:

> 'Does it follow that Jones and Smith grasp the same meaning, an object of the common or abstract language? If so, then we should draw the analogous conclusion about pronunciation, given that Jones understands Smith to be saying 'tree'; since Jones understands Smith, it must be that there is some object of the common language, the real or common pronunciation of 'tree', that Jones and Smith both grasp. No one is inclined to make that move. Rather, we say that Jones and Smith have managed a mutual accommodation that allows Jones,

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> sometimes at least, to select an expression of his own language that, for the purposes at hand, matches well enough the one that Smith has produced.'

Chomsky sees no need to proceed to the 'absurd conclusion' that there is a common pronunciation shared by Smith and Jones. Given arguments such as Chomsky's, it is simply unacceptable for Freyd to operate with a notion of 'shared language' without having shown that it is immune to Chomsky's objections. The same goes for Freyd's notion of 'external language structure'. To proceed in a nonarbitrary way, she has to show that this notion is free of the defects which Chomsky has diagnosed in well-known notions of 'E(xternal)-language'.[22]

Second, Freyd makes no attempt to clarify and justify her distinction between 'the human language faculty' and 'the ability to acquire and use language', a distinction not drawn explicitly within a Chomskyan linguistic ontology. The former faculty, she asserts, is 'the mental mechanisms that support' the latter ability. But she does not clarify this distinction, not even from her own evolutionary perspective. For example, does natural selection 'operate' on the latter ability as it does on 'the human language faculty'? Or does this ability, like 'language', 'evolve at a much faster rate' than the 'human language faculty'?

Clearly, then, a fundamental problem with Freyd's conception of 'language as a public, shared system' --- and with the tripartite distinction which it is involved in --- is that it is not founded in a clear understanding of the standards of adequacy that a linguistic ontology in general and a conception of language in particular have to meet.[23] Interestingly, moreover, when P&B (1990:775) reject Freyd's criticisms of their selectionist account, they do so on the ground that she has failed to come to grips with three specific properties of 'language', and **not** on the ground that her criticisms are based on the flawed distinction 'language as a public, shared system vs. the human

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language faculty vs. the ability to acquire and use language'. This, too, illustrates that even sophisticated discussions of language evolution may be insufficiently sensitive to ontological distinctions which are crucial to the sharpness of their explanatory focus.

5 'The language faculty vs. characteristics of the language faculty'

Let us assume, for the sake of argument, that language is to be identified with the language faculty. Then the explanatory focus of a selectionist account of the evolution of language has to be restricted to the initial state of this faculty. But even such an assumption is likely to leave this focus insufficiently sharp, as is clear from the 'problem' which Elliott Sober (1990:764) poses to both critics and defenders of P&B's target article in the BBS discussion:

> 'I would like to pose a problem for both critics and defenders of Pinker & Bloom's (P&B's) target article to consider. The subject at hand is whether "the human language faculty" can be explained by Darwinian natural selection. Both sides will be happy to grant that "the human language faculty" has a multiplicity of characteristics. How much of a dispute would remain if this single question about the evolution of a univocal object - "the human language faculty" - were replaced by a set of questions, each of them focusing on a different characteristic of the human language faculty?'

To make his point more concrete, Sober (1990:764) refers to the 'human birth canal', observing that it would be a waste of time to wonder whether this was the product of natural selection. Whereas some of the features of this canal may be adaptive, others may not be. The moral drawn by Sober (1990:764) from this example is that

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> 'Presumably, we would want to tell quite different stories and to muster quite different kinds of evidence when we replace a single phenotype with a set of more finely individuated phenotypes.'

Referring to an example of Lewontin's, Sober (1990:764) notes that a selectionist 'story' involving self-defence can be told if we ask why rhinoceri have horns. However, if we ask why one rhino species has one horn but another has two, a selectionist 'story' would probably not do. A 'story' involving purely historical factors concerning the state of two ancestral populations would probably give a better explanation for the difference in the number of horns. The point, in Sober's (1990:764) view, is that

> '... adaptationist and nonadaptationist explanations can sometimes exist in perfect harmony, once the different *explananda* are separated.'

As noted by Sober (1990:764) too, P&B recognize the need to distinguish some features of (the) language (faculty) from others. Thus, they (1990:718) claim that if one 'part of language' has no function, it would not mean that all 'parts of language' have no function. To which Sober (1990:764) adds that

> 'The converse of this claim is no less true and no less important. An overall assessment of whether the entirety of the structure is "mainly" due to natural selection cannot be obtained without this sort of attention to details ("parts").'

In their response to Sober's commentary, P&B (1990:765-766) express general appreciation of his 'lucid arguments' and 'helpful commentary'. They do not take up his point, however, about the need for an evolutionary point of view to distinguish between (the) language (faculty) as a 'univocal object' on the one hand and specific characteristics of this faculty on the other hand. And they do not consider the consequences of focusing

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selectionist accounts on specific features of the language faculty for the adequacy of their selectionist account of the evolution of (the) language (faculty) as a 'univocal object'. Rather, they (1990:773) keep on talking about (the) language (faculty) as if it had evolved as a 'univocal object', saying such things as:

> 'The way to explain the evolution of *language* may not be to look for some climatic or ecological condition to which *it* was a direct selective response.' [Emphases added --- R.P.B.]

Such a 'univocal' or 'holistic' perspective gives rise to awkward questions about what to make of fundamental characteristics of (the) language (faculty) for the evolution of which there does not appear to be a plausible selectionist account.[24] And if selectionist accounts were to focus on individual characteristics of (the) language (faculty), questions would arise about the sense in which and the conditions under which (the) language (faculty) could be nonarbitrarily claimed to be a system or structure evolved by natural selection. Once again, what we see are symptoms of a blurring of explanatory focus. And the question is this: could inclusive selectionist accounts of the evolution of (the) language (faculty) be free of such 'focal blur' in principle?[25]

6 'Origin of the language faculty vs. maintenance of the language faculty'

In their target article, what P&B (1990:707, 708) are concerned with is what they call the 'evolution' or 'origin' of (the) language (faculty). But it is less than clear precisely what phase in the genesis/development of (the) language (faculty) they mean to denote by the terms 'evolution' and 'origin'. Thus, in his commentary on the article, Mark Ridley (1990:756) makes the following 'point' about 'the nature of modern adaptationism':

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> 'The question of why a character [i.e., a component of the phenotype --- R.P.B.] originally evolved is an interesting one, but it may be worth stressing that most modern work on adaptation is not directly concerned with it. Such methods as optimization (Maynard Smith 1978) and game theory (Maynard Smith 1982) consider only how natural selection maintains a character in a population. They are concerned with whether mutant forms of the character will spread. Earlier work on adaptation was also concerned with this question. The adaptationist's question has the scientific merit of accessibility. In some cases, it is easy to test whether natural selection favors a variant of a character.
>
> I realize that the dispute between Pinker & Bloom, and Piattelli-Palmarini, Gould, and Chomsky concerns the origin, not the maintenance, of language by natural selection.'

P&B's response to Ridley's distinction between the origin and the maintenance/spread of a character and to his reading of the dispute in question is quite interesting. To begin with, they (1990:765) give him credit for making

> '... the interesting point that the *origin* of a structure and the *maintenance* of a structure are different questions in evolutionary biology, and that often the tractable scientific work, driven by analyses of selective pressures and adaptive design, is restricted to the latter.'

Next, P&B (1990:765) draw a distinction, differing at least terminologically from Ridley's, one between the origin of a character (or structure) and its maintenance:

> 'We note that for similar reasons, the *appearance of a structure in its initial form* is a different matter from the *elaboration and complication that leads to its fulfilling its current function*.' [Emphases added --- R.P.B.]

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Finally, with the aid of the distinction between a structure's appearance in its initial form and the structure's elaboration and complication, P&B (1990:765-766) attempt to clarify the nature of the developmental phase of (the) language (faculty) on which they mean their selectionist account focus:

> 'We believe that this distinction helps explain why [accounts of --- R.P.B.] the evolution of language [have] gotten the bad reputation of unmotivated storytelling. In fact, it is reconstructions of the *origin* of language, from "bow-wow" theories onward, that are often tainted by a lack of constraining evidence and far-fetched efforts to find precursors. Our strategy is different: We say virtually nothing about the precursors and very first forms of language and the specific sequence leading to its current form (...); we instead focus on evidence of adaptation from signs of design in synchronic language structure and acquisition, where the data are rich and abundant.'

These remarks give rise to various questions: Is P&B's distinction 'appearance in the initial form vs. elaboration and complication' distinct in ontological import from Ridley's distinction 'origin vs. maintenance/spread' in the sense that the corresponding terms denote distinct developmental phases? For example, do Ridley's term(s) 'maintenance/spread' and P&B's expression 'elaboration and complication' refer to the same evolutionary phase? Which of the phases in question is in fact the focus of P&B's selectionist account and which is at issue in the dispute mentioned by Ridley? The origin, as suggested by Ridley? Or some later phase, as P&B seem to suggest? If it is indeed so that P&B 'say virtually nothing about the precursors and very first forms of language and the specific sequence leading to its current form', how should one read section 5 ('The process of language evolution', pp. 721-726) of their article as well as their later

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defensive response to criticisms of some of the claims they express in that section? In that section, they (1990:721) argue at length

> '... that what we do know from the biology of language and evolution makes each of these postulates [about the process of language evolution --- R.P.B.] quite plausible.'[26]

Considered from a non-ad hoc perspective, what are the phases that should be distinguished in the 'evolution' of a biological structure? And which (one or more) of these phases should/could be focused on by a selectionist account of the evolution of (the) language (faculty)? Needless to say, selectionist accounts of the 'evolution' of (the) language (faculty) that do not proceed from clear answers to these and related other questions run at least two grave risks: the risk of failing to be properly focused and, consequently, the risk of failing to be appropriately justified.[27]

7 The substance of a matter

In sum, then, what have we seen? Firstly, a selectionist account of the evolution of language, even when as relatively sophisticated as P&B's, can have an explanatory focus that is less than sufficiently specific. Secondly, this kind of flaw can be caused by indeterminacies in the ontological import of conceptual distinctions such as 'language vs. the language faculty', 'the language faculty as a whole vs. characteristics of the language faculty' and 'origin of the language faculty vs. maintenance/spread of the language faculty vs. elaboration/complication of the language faculty'. In such a selectionist account, as a result, the expression 'the evolution of language' becomes quite opaque: it fails to identify clearly what it is that has to be explained. Particularly troublesome is the way in which P&B have drawn the distinction between 'language' and 'the language

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faculty'. The ontological presuppositions and implications of drawing this distinction in this way have generally been neither explicitly recognized nor explicitly addressed.

The fact that a relatively sophisticated selectionist account of the evolution of language is less than sufficiently specific in regard to explanatory focus does, however, not imply that all selectionist accounts must necessarily have this flaw. There is no principled reason to assume that concepts such as 'language', 'the language faculty' and so on have to be indeterminate in their ontological import.[28] And there is every reason to disallow as a point of departure the view that ontological opacity could or even should be tolerated in the study of language genesis, contrary to what Robin Allott (1989) seems to suggest:

> 'The only trap which should be avoided is an over-hasty linguistic analysis of the problem, e.g. by the premature introduction of technical uses of terms into a field where confusion about the words we use is so easy. In this category of premature technical terms, I would put words like symbol, symbolicity, icon, iconicity, arbitrary, semiotic, dual articulation. Words or phrases such as these give the impression that we know what we are talking about or agree what we are talking about when we do not know or do not agree.' (p.3)
>
> 'To summarise: we need not worry much about the definition of language. We are concerned with ordinary human spoken language in the first place, though we need not exclude wider aspects of language and communication later in our research.' (p.4)[29]

By giving it a foundation in an adequate linguistic ontology, one can prevent a selectionist account of the evolution of language from having a blurred explanatory focus. The fundamental ontological assumptions which such accounts draw on need not of necessity be either obscure or flawed in any other way.

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NOTES

* I would like to thank Walter Winckler for his skillful editing of this paper.

1 For a standard exposition of this theory, see for example Mayr 1982, 1992, Ridley 1993. For a discussion of 'familiar' criticisms by scientists of this theory, see Kauffman 1993:16-21. An informal account of neo-Darwinian reactions to some of these criticisms is offered by Dennett 1995a: chaps. 9-11.

2 The most influential biological conception of language is that proposed by Noam Chomsky (1980, 1986, 1987a, 1987b, 1988a, 1988b, 1988c, 1989). For a systematic account both of the Chomskyan or generativist conception of language and of major criticisms of it, see Botha 1989: chap. 2, 1992: chap. 3. Bickerton (1981, 1984, 1990) and Lieberman (1984, 1991) have developed biological conceptions of language which differ from Chomsky's in important ways.

3 For introductory accounts of some of this work, see, for example, Danesi 1995:316-320 and Maynard Smith and Szathmáry 1995:290-293. Pinker and Bloom 1990 offers a synthesis of interesting contributions to this work. We will return to Pinker and Bloom's study directly below. From this point on, in this paper, I will use the term 'selectionist account' in place of the more unwieldy 'neo-Darwinian selectionist account'. Some scholars refer to such accounts as 'adaptationist accounts'.

4 For the way in which insights into these and other aspects of language enter into a selectionist account of the evolution of language, see, for example, Pinker and Bloom 1990.

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5 Approximately fifteen years later, Chomsky (1988c:22) stated in similar vein that "In this regard [the evolution of infinite digital systems --- R.P.B.], speculations about natural selection are no more plausible than many others ...'. Recently however Chomsky (1996a:41), in response to criticisms by Dennett (1995a:384ff.) and Maynard Smith (1995:48), has stated that it is incorrect to claim that he (i.e., Chomsky) has placed language 'outside the scope of evolutionary theory'. For conflicting interpretations of Chomsky's 'actual' views of the role of natural selection in the evolution of language, see, for example, Dennett 1995a:389, 1995b:122, Jackendoff 1990:737, Maynard Smith and Szathmáry 1995:290, Otero 1990:747-748, Pinker and Bloom 1990:708, 720, 768-770.

6 The literature offers many additional examples of judgements in the spirit of those by Chomsky and Lewontin. Consider the following ones:

> 'Despite the vigor of their discussion and many interesting observations along the way, P&B never provide a single detailed discussion of this type for a grammatical principle [i.e., the type spelling out the environmental pressures that would make the principle functionally advantageous --- R.P.B.]. Unfortunately, nothing less will do if what P&B wish to show is that complex properties of grammar are due to the workings of natural selection.' (Hornstein 1990:736)

> 'Like Rousseau before them, P&B have lost track of the fact that Descartes' argument for dualism, stemming from the creativity manifested in the use of language, has already suggested a radical alternative. The cultural retrogression is anything but small: We are back at the level of the

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> eighteenth century controversy on the origin of language ... ' (Otero 1990:749-750)

> 'In fact, progress in linguistics has been achieved precisely by turning away from the topics that P&B find important and by turning toward precisely those properties of language that look nonadaptive but complex. Perhaps, there is another kind of linguistics that will make P&B's case for them, but for now we have no indication of what it might look like.' (Pesetsky and Block 1990:752)

> 'Our exchange can then only turn into an empty battle of quantifiers and modals. We would fight over what is "more" and what is "less" plausible, over what might have happened and what may have happened. Resting their case on data that their own approach would have made impossible to collect, they proceed to construct an a posteriori, ad hoc, irrefutable explanation. They force me into a position from which I can only criticize whole-sale the scientific ideology of their approach.' (Piattelli-Palmarini 1990:754)

The literature, however, offers just as many, if not more, examples of judgements with the general drift of those by Pinker and Bloom and by Dennett, including the following:

> 'Pinker and Bloom (P&B) have done us a service in refuting the widespread belief among generativists that language could not have been evolved by natural selection.' (Broadwell 1990:729-730)

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'Pinker and Bloom's (P&B's) target article is deeply satisfying and liberating.' (Hurford 1990:736)

'Although our discussion focuses on sound systems [= on systems of sound --- R.P.B.], it strongly reinforces Pinker and Bloom's P&B's) general claim that language evolved by natural selection.' (Lindblom 1990:743)

'The authors are to be honored for a paper that goes a long way toward countering the intemperate anti-Darwinism that has become the mode in some cognitive science circles over the past decade.' (Studdert-Kennedy 1990:758)

'Because I find the general thrust of the Pinker and Bloom (P&B) target article to be compelling, this commentary will be devoted to further exploring the consequences of their hypothesis that the language faculty was shaped by natural selection.' (Newmeyer 1990:745)

Darwin (1859:81) defined 'Natural Selection' as the 'preservation of favourable variations and the rejection of injurious variations'. On a more modern characterization by Mayr (1993:183), natural selection is 'The nonrandom survival and reproductive success of a small percentage of the individuals of a population owing to their possession of, at that moment, characters which enhance their ability to survive and reproduce.' Sober (1984:27) characterizes the way in which 'the force of natural selection works' as follows: 'if the organisms in a population that possess one characteristic (call it *F*) are better able to survive and reproduce than the organisms with the alternative characteristic (*not-F*), and if *F*

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and *not-F* are passed from parent to offspring, then the proportion of individuals with characteristic *F* will increase'.

8 In an equivalent formulation by P&B (1990:709), language is said to be characterized by adaptive complexity.

9 This account is offered by P&B within the framework of the 'synthetic' (neo-Darwinian) theory of evolution. This latter theory --- also called the 'evolutionary synthesis' by Julian Huxley --- is 'synthetic' in the sense that it combines what Mayr (1993:134) calls 'the best elements of both genetics and systematics and, furthermore, certain ideas of paleontology and macro-evolution'. For an accessible characterization of the substance of these 'elements' and 'ideas' see Mayr 1993:134 and Kauffman 1993: chap. 1, Ridley 1993:15-19. The claims making up P&B's selectionist account fall into three general categories:

(a) Claims/assumptions (e.g., 3a) made about certain properties of language. These claims/assumptions represent the explanandum of P&B's account.

(b) Claims/assumptions (e.g. 3b and d) collectively offering an explanation of the language properties mentioned. These claims/assumptions represent the explanans of P&B's account.

(c) Claims/assumptions (e.g., 3c and 4b) collectively showing how good this explanation is in comparison to alternative explanations. These claims/assumptions constitute the comparative justification for the explanation offered by P&B's account.

10 As observed by Limber (1990:742) in the BBS discussion, Baldwin argued that 'adaptive behaviors that were passed culturally from generation to generation

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might be assimilated into the nervous system exclusively by means of natural variation and selection.'

11 As a matter of fact, it is unclear whether Sperber and Ninio draw the same distinction as P&B; P&B, though, react as if such were the case.

12 Chomsky (1981:34-35), while providing for 'intermediate states' as well, has little to say about them.

13 For a characterization of the initial state of the language faculty, see also Chomsky 1980:65, 187; 1987a:34-35; 1986:25-26.

14 Chomsky (1981:34-35) has also called the initial state of the language faculty 'universal grammar (UG)' or 'the language acquisition device'. For further discussion of this state, see Botha 1989:255ff.

15 For Chomsky's general characterization of this state, see, for example, Chomsky 1986:24-26. For a discussion of important distinctions that need to be drawn in regard to this stable (or steady) state of the language faculty, see Botha 1989:25-27, 57ff.

16 For a discussion of the nature of such 'triggering' and 'shaping', see Chomsky 1980:33, 34, 45, 142; and Botha 1989:16-17.

17 Chomsky (1980) has referred to this state variously as 'knowledge of grammar', 'grammatical competence', 'mental grammar' and 'internalized grammar'. For this point of terminology, see Botha 1989:74-75.

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18 For similar other remarks, see Chomsky 1986:27, 1987a:17. For some discussion of these remarks, see Botha 1992:90-91.

19 See also Chomsky 1986:22 for a distinction between 'knowing a language' and 'the known abstract entity'.

20 The possibility that a language could also be an abstract Platonic entity has been rejected by Chomsky (1986:33): 'There is no initial plausibility to the idea that apart from the truths of grammar concerning the I-language and the truths of UG concerning S_0 there is an additional domain of fact about P[latonic]-language, independent of any psychological states of individuals'. Platonic abstract objects incidentally, because they are entities that are non-biological, timeless, placeless and changeless, cannot be subject to evolution. For the characteristics of such entities, see Katz 1981:181.

21 Recently, Chomsky (1996b:1) has raised the possibility that performance systems which access and use the language faculty may in fact be part of the language faculty.

22 In essence, Chomsky's (1986:20-31, 1987a:33) criticisms of concepts of 'E(xternal) language' concern their 'artificial' character and their deviation from the common-sense concept of language. For a detailed account of these criticisms, see Botha 1992:83-86.

23 Stated in the form of (diagnostic) questions, these standards for linguistic ontology include the following ten:

(a) Is the conception (of language) sufficiently focused?

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(b) Is the conception grounded systematically in nontrivial linguistic facts?

(c) Does the conception provide a good basis for interlinking language with other linguistic entities, processes etc.?

(d) Does the conception allow for the interlinking of linguistic reality with other, nonlinguistic, realities?

(e) Are the ontological predicates used by the conception non-obscure?

(f) Does the conception give a relatively deep ontological characterization of language?

(g) Is the conception internally free of contradictions, tensions, spurious distinctions etc.?

(h) Does the conception have sound philosophical foundations?

(i) Is the conception free of undesirable epistemological presuppositions and/or consequences?

(j) Has the conception shown itself to be heuristically fruitful?

For a discussion of these standards of adequacy, see Botha 1992:254-258.

24 I will return to these characteristics in the next paper of the series.

25 Not all selectionist accounts focus on (the) language (faculty) as a 'univocal object'; some of them --- e.g. those of Brandon and Hornstein (1986) and of Hurford (1989) --- focus on specific characteristics of (the) language (faculty).

26 For a summary of these 'postulates', see P&B 1990:721, and for an informal discussion of some of them, see Pinker 1994: chap. 11.

27 Recall Ninio (1990:746), in her commentary, draws a distinction between two mutually contradictory versions of P&B's 'evolutionary theory'. In version A, she

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claims, natural selection started to operate (early) on the human language faculty, from the initial grammarless moment. In version B, natural selection started to operate (later) on a full-blown language and has consisted only in the gradual genetic fixing of grammatical knowledge. (In Par. 1 above, I have used the informal term *beginnings* to refer inclusively to both the initial and the later phases in the evolution of language.)

28 Pinker seems to assume a linguistic ontology within which language is at once an ability (P&B 1990:707, Pinker 1995:224), a skill (P&B 1990:707, Pinker 1995:224), an instinct (Pinker 1994:18, 1995:224) and a faculty (P&B 1990:707-708, Pinker 1995:224). It is far from clear, however, what one stands to gain by conflating what have been treated as distinct ontological categories. Chomsky (1980, 1988a), for example, has developed a linguistic ontology in terms of which knowledge, ability, skill, capacity and so on represent distinct kinds of entities. For some discussion of a number of the distinctions drawn by Chomsky, see Botha 1989: chap. 2.

29 These views are expressed by Allott in a paper presented at an annual meeting of the Language Origins Society. Allott's paper directly follows an introduction by Bernard Bichakjian (1989) that bears the unintentionally ironical title 'Language origins: a fresh start'.

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