Windows On Language Evolution:
How Are They Constructed?[*]

Rudolf P Botha

Department of General Linguistics, Stellenbosch University, 7600
Stellenbosch, South Africa. E-mail: rpb@sun.ac.za

1.   Introduction

In his delightful essay *Fenestralia*, Max Beerbohm argues that windows are objects of great virtue:

> "There is much virtue in a window. It is to a human being as a frame is to a painting, as a proscenium to a play, as "form" to literature. It strongly defines its content. It excludes all but what it encloses. It firmly rivets us. In fact, it's a magic encasement." ("Fenestralia", *Mainly on Air*, 1946, p. 115)

In the context of investigating the evolution of language, windows of a certain, nonphysical, kind are believed to be objects of great virtue as well. But what would this belief involve?

---

[*]This article is based on a part of a paper presented at a Workshop on Language Genesis that was held at the University of Verona on 4 June 2004.

The evolution of language, I have shown elsewhere (Botha, 2003, pp. 1-5), has for a long time been considered a phenomenon about which there is a paucity of direct evidence. An increasing number of scholars, consequently, has attempted to discover what language evolution involved by studying other phenomena about which there is a sufficiently large body of direct evidence. As explained in (Botha, 2004a), the latter phenomena have, metaphorically speaking, been said to offer windows on language evolution. Thus, prehistoric stone tools and art, (fragments) of ancestral skulls, pidgin languages, the language of very young children, motherese, the homesigns created by deaf children of hearing parents, the language of agramamtic aphasics and so on have been accorded such "window" status.

In nonmetaphorical terms, a window on language evolution is, in essence, a device for making inferences about language evolution. This is to say that to – metaphorically – "see" a property of some aspect of language evolution by – metaphorically – "looking at" a property of some other phenomenon is – nonmetaphorically – to infer that first property from data about this second property. So the question arisis:

(1)   What does it involve to construct a window on language evolution?

This is the question that will be pursued in the present article.

From earlier work – e.g., (Botha, 2004a) – it will be clear that constructing windows on language evolution is a complex task: it calls for both conceptual analysis and empirical work, including the use and development of various kinds of theories. In this article, I will attempt to give a better idea of what this task involves by doing two things. First: at a general level, I will provisionally point out aspects of window construction that seem to me to be not only conceptually distinct from one another but also basic. Second: more concretely, I will try to convey something of the "feel" of the kind of spadework that a particular one of these aspects would call for if one attempted to use the homesigns created by deaf children of hearing parents as a window on language evolution.

2.   Basic aspects of window construction

The basic aspects of window construction can be provisionally and roughly characterized as in (2). (The four abbreviations used in (2) are as follows: "F" stands for some feature whose evolution is at issue; "P" stands for a phenomenon that is distinct from language evolution; "C" stands for a cluster of such phenomena; and "W" stands for some window on the evolution of a feature of language.)

(2)   (a)   *Clarifying the nature of F.*   This involves –

   (i)   determining whether F is a feature of language, of some other linguistic entity or of a nonlinguistic entity; and

   (ii)   determining whether F is a feature of a kind believed to be affected by biological evolution, cultural evolution or some other kind of evolution.

(b)   *Clarifying what it is that has to be found out about F's evolution.*   This involves –

   (i)   pinpointing the aspect/aspects of F's evolution that is/are at issue: When/why/for what purpose/how/out of what/as what/in what form etc. did F first emerge etc.?; and

   (ii)   pinpointing the phase(s) in F's evolution that is/are at issue: first emergence, subsequent development etc.

(c)   *Getting a "handle" on a phenomenon P (or cluster of phenomena C) which seems to have properties that may provide a window W on what is at issue about F's evolution.*   This involves –

   (i)   determining whether it is possible to discriminate between P (or C) and related but distinct phenomena on the basis of what is currently understood about P's (or C's) properties; and

   (ii)   investigating P (or C) in more depth in order to gain – if necessary – a better understanding of its distinctive properties.

(d)   *Forming a first idea of where it is that the heuristic potential of P lies and of how big that potential is.*   This involves –

   (i)   provisionally identifying ways in which properties of P may give the desired view on the evolution of F; and

   (ii)   provisionally identifying ways in which the view given by the properties of P on the evolution of F may be incomplete, distorted or otherwise flawed.

(e)   *Giving a justification of the judgements made in (d)(i) and (ii).* This involves –

   (i)   explaining why the pertinent properties of P may be taken to bear on the evolution of F in the ways identified in (d)(i); and

   (ii)   explaining how the limitations identified in (d)(ii) affect the heuristic potential of W.

(f)   *Subjecting W to systematic appraisal.*   This involves –

   (i)   considering the extent to which W has such good-making features as groundedness, relevance and pertinence;

   (ii)   considering the extent to which the view offered by W on the evolution of F is congruent/incongruent with the view offered by other windows on the evolution of F; and

   (iii)   taking all the relevant considerations into account to assess how good W is overall as a window on the evolution of F.

The characterization in (2) of the basic aspects of window construction is open to misunderstanding in two general ways (at least).

Firstly, the format in which (2)(a) – (f) are stated might be taken as "procedural": the various aspects might be equated with so many steps in a procedure for constructing windows in a mechanical way. Such a "procedural" reading would be completely mistaken, though. There is nothing mechanical about constructing a window on language evolution. Window constructing demands substantive work; and that substantive work

cannot but rely on the use or formation of one or another kind of theory at every point, as is explained in some detail in (Botha, 2004). After all: Aspect (2)(a) involves recourse to a well-articulated theory of language. Aspect (2)(b) presupposes a sophisticated general theory of evolution; Aspect (2)(c) involves the use and/or construction of insightful empirical theories of window phenomena; Aspects (2)(d) and (e) require the use or construction of bridge theories; and Aspect (2)(f) presupposes a metatheory of the good-making properties of inferential devices of the sort instantiated by windows. In the nature of things, matters such as the six listed in (2) are all supposed to be conceptually distinct aspects of window construction; and, in the nature of things, such aspects do not map in any simple one-to-one way onto steps that may be carried out in the construction of some actual window on language evolution.

Secondly, the number of basic aspects listed in (2) is also open to misunderstanding. It might wrongly be taken as "strictly fixed". Of necessity, however, this number – six – has had to be arrived at by relatively arbitrary means. Split certain aspects into smaller ones, and the number would go up. Join some aspects together into more inclusive ones, or reduce some groups of related aspects to more fundamental ones, and the number would go down. Much more is going to have to be done in the way of conceptual analysis before it will become possible to have a list of basic aspects that would resist revision in these and other ways.

3. Sizing up homesigns as a potential window phenomenon

Suppose, then, you wanted to construct a window on some aspect of the evolution of some feature of language, say recursion. How would you have to go about this? This is the question that I turn to now. More specifically, I will be considering what this might involve in terms of Aspect (2)(d) of window construction: judging in a preliminary way the heuristic potential of some window phenomenon. For purposes of illustration, let's take it that what has been identified as a potentially interesting window phenomenon is the homesign systems constructed by deaf children of hearing parents.

As characterized by Ann Senghas and Marie Coppola (2001, p. 323), homesigns are

gestural communication systems developed by deaf children who are not exposed to conventional spoken or signed language. And work done by Susan Goldin-Meadow (2002, 2003) and her associates suggests that properties of these systems may provide a window on language evolution. Thus, to Goldin-Meadow, –

> "[o]ur challenge is to discover the forces that shape gesture creation in deaf children – for these are forces that are likely to play a role in language creation every time it takes place, perhaps even the first time." (Goldin-Meadow, 2002, p. 369).

Interestingly, this view of the potential that homesigns have as a window on language evolution is shared by scholars with quite different disciplinary orientations, including Ray Jackendoff (1999, 2002), Sonia Ragir (2002) and Dan Slobin (2002, 2003).

Which brings us to the question: What are the ways in which homesigns could possibly offer a window on the evolution of features of language? These ways include *in principle* the following:

(3)   (a)   The *environments* in which homesigns are created by deaf children could be similar/parallel to those in which language first emerged in our species.

       (b)   The "*organisms*" that create homesigns could be similar to those that created the first human language.

       (c)   The properties of the gestural *systems* representing homesigns could be similar/parallel to those of the first language.

       (d)   The mode of *development* by which homesigns develop into full sign languages could be similar/parallel to that by which the first language developed into full human language.

But now the vital question: Can homesigns *actually* serve as the basis of a window on language evolution in any one or more of these four ways? For any serious opinion on this matter, some serious spadework has to be done: provisionally identifying properties of homesign creation that, in all likelihood, characterized language evolution as well.

Doing this, of course, involves provisionally identifying properties of homesign creation that, in all likelihood, did not characterize language evolution too. Here, I can only offer to outline some of the published observations on such similarities and differences between homesign creation and language evolution, without thereby necessarily endorsing these observations.

4.   The environments

For Goldin-Meadow, the environments or "worlds" in which homesigns are created and those in which language first emerged need to be analysed in terms of a distinction between linguistic environments and cultural environments. Broadly put, the point then is that the two linguistic environments – the one in which homesigns are created and the one in which language first emerged – are crucially similar to one another, but that the two cultural environments are crucially dissimilar from one another.

The two *linguistic environments* are taken by Goldin-Meadow (2002, p. 344; 2003, p. 228) to be similar in a first way that she and others find highly significant. On the one hand, homesigns are created in the absence of a "language model". That is, deaf children who create homesigns are not exposed to an existing spoken or signed language. For the vast majority of young deaf children, as a result, linguistic experience is restricted to non-linguistic gestures made nonsystematically by hearing parents or other siblings. On the one hand, language too first emerged in the species in an environment in which there was no linguistic model.[1]

On Goldin-Meadow's (2002, pp. 345, 368; 2003 p. 222) analysis, the two linguistic environments are similar in a second way as well. In creating their homesigns, deaf children lack a communication partner who is willing to create a system with them. The families of the deaf children studied by Goldin-Meadow and her associates attempted to educate their children by an oral method and their focus was on their children's verbal abilities. These families did not treat their children's gestures as utterances of a language. In this sense, they were not partners in their children's gestural communication. Goldin-Meadow now assumes – along with Eric Pederson – that the first language-creator was in

a similar situation: The others that this creator was communicating with were probably willing or eager to interact with him/her; but these others are unlikely to have shared the creator's emerging language.

As regards the *cultural environment* in which homesigns are created and the one in which language first emerged, Goldin-Meadow (2002, p. 368) identifies a difference that she and others find important. Deaf children develop their homesigns in a world in which "language and its consequences are pervasive". In Goldin-Meadow's (2002, p. 378) view, it may be necessary for these children to experience the human cultural world and specifically the artifacts that evolved along with language. It may well be that these served as "supports" for the children's invention of "language-like systems for communicating both within and beyond the here and now". In this respect then, according to Goldin-Meadow, the "language-creation situation" of these children does not simulate the situation in which language was created for the first time. Slobin (2003, p. 13) concurs with this view and observes, in addition, that the "cultural world" in which homesigns are created includes "social patterns of interaction" that did not form part of the "world" in which language first appeared.

5.   The organisms

Deaf children are in Goldin-Meadow's (2003, p. 227) phraseology "organisms" that are "ready for language" in the same way as hearing children. Specifically, deaf children have "language-making skills" that do not require a conventional language model – that is, linguistic experience – to develop oral or signed language. These language-making skills include on Goldin-Meadow's account two kinds of things. On the one hand, they include "processes that children apply in a communication situation even if not exposed to a language model". She (2003, p. 190) provides for three such processes: (i) segmenting of words into morphemes and of sentences into words, (ii) constructing of paradigms ("morphology") by setting up systems of contrasts, and (iii) constructing sequences ("syntax") which involves building a sequence around an underlying frame, marking thematic roles within the sequence, and combining propositions to generate new sequences. On the other hand, deaf children's language-making skills include structures

whose acquisition does not require a language model. These structures, according to Goldin-Meadow (2003, p. 190), are (i) one-, two-, and three-argument predicate frames, (ii) nouns, verbs, and adjectives, and (iii) ergative constructions.

The language-making skills of both deaf and hearing children form part of what Goldin-Meadow (2003, p. 228) refers to as the "initial grammatical state" in which the children are prior to any linguistic experience. She also refers to components of this state as "biases that all children bring to language-learning". Goldin-Meadow (2003, pp. 15, 197) seems to hold, moreover, that the initial grammatical state in which children are prior to linguistic experience is of essentially the kind that is characterized by a Chomskyan theory of Universal Grammar; such a theory "formulates the knowledge children bring to language-learning in terms of principles and parameters that determine the set of possible human languages".

Note here a crucial difference between children who create homesigns and our ancestors who created the first language: right at the start, those ancestors did not have the language-creation skills that these children now do have. The ancestors, in other words, did not possess a language capacity.

6. The systems

Turning next to the gesture systems created by deaf children, these have a number of properties that Goldin-Meadow (2003, p. 185) characterizes as "resilient" or "robust" in the sense that "they crop up in a child's communications whether or not that child is exposed to a conventional language model". Some of the resilient properties of these gesture systems she summarizes in the table taken over in (4) below:

(4)

TABLE 6. The Resilient Properties of Language

The Resilient Property	as Instantiated in the Deaf Children's Gesture Systems
Words	
Stability	Gesture forms are stable and do not change capriciously with changing situations (Ch. 8)
Paradigms	Gestures consist of smaller parts that can be recombined to produce new gestures with different meanings (Ch. 9)
Categories	The parts of gestures are composed of a limited set of forms, each associated with a particular meaning (Ch. 9)
Arbitrariness	Pairings between gesture forms and meanings can have arbitrary aspects, albeit within an iconic framework (Ch. 9)
Grammatical Function	Gestures are differentiated by the noun, verb, and adjective grammatical functions they serve (Ch. 12)
Sentences	
Underlying Frames	Predicate frames underlie gesture sentences (Ch. 10, 11)
Deletion	Consistent production and deletion of gestures within a sentence mark particular thematic roles (Ch. 10, 15)
Word Order	Consistent orderings of gestures within a sentence mark particular thematic roles (Ch. 10, 15)
Inflections	Consistent inflections on gestures mark particular thematic roles (Ch. 10)
Recursion	Complex gesture sentences are created by recursion (Ch. 11, 15)
Redundancy Reduction	Redundancy is systematically reduced in the surface of complex gesture sentences (Ch. 11)
Language Use	
Here-and-Now Talk	Gesturing is used to make requests, comments, and queries about the present (Ch. 13)
Displaced Talk	Gesturing is used to communicate about the past, future, and hypothetical (Ch. 13)
Generics	Gesturing is used to make generic statements, particularly about animals (Ch. 13, 15)
Narrative	Gesturing is used to tell stories about self and others (Ch. 13, 15)
Self-Talk	Gesturing is used to communicate with oneself (Ch. 13)
Metalanguage	Gesturing is used to refer to one's own and others' gestures (Ch. 13)

(Goldin-Meadow, 2003, p. 186)

Goldin-Meadow does not systematically consider properties in terms of which the first human linguistic system may have been similar to homesigns. Drawing on Goldin-Meadow's work, Slobin (2003, p. 13), however, speculatively mentions two properties

that are shared by homesigns and what he calls "proto-language": referential symbols and meaningful symbol order. In attempting to draw conclusions from the properties of homesigns about properties of the first human language, the effects of some of the important differences (i) between the two genetic environments, and (ii) between the two kinds of language creators, have to be factored out. A particularly pertinent difference seems to be one existing between the two kinds of organisms: whereas deaf children have an inherited language capacity or faculty that contributes linguistic biases and other resilient linguistic properties to homesigns, our ancestors who created the first language did not at first possess any such capacity.

7.   Development

There exists a rich body of data about the way in which homesigns develop into full sign languages, specifically about how homesigns have developed since 1980 into Nicaraguan Sign Language.[2] It is possible to mention only two aspects of this process here. First, as observed in publications by Ann Senghas, Marie Coppola, Judy Kegl, Susan Goldin-Meadow and others, this process required a community made up of willing signers. Second, on the account of it given by Kegl, Senghas and Coppola (2000, pp. 180-181), this process comprised three phases. In the first phase, on the basis of the substrate of homesigns, there developed a highly variable and ever-changing peer group pidgin or jargon after homesigners came into regular contact with each other. In the second phase, a signed creole came abruptly into being via normal language acquisition when this pidgin/jargon became the linguistic input to very young children. In the third phase, the newly emerged creole quickly took its place as the target sign language for other young acquirers and pidgin/jargon signers.

As for parallels between the development of Nicaraguan Sign Language and the development of more complex forms of human language, it has been observed that this latter process requires a community of willing language users as well. In the absence of such a community, the first forms of language would have "stagnated", to use an expression of Slobin's (2003, p. 13). With respect to Nicaraguan Sign Language, Kegl and others appear not to have speculated that (something like) its three phases of

development might have occurred in the evolution of language. There is a considerable body of other work, however, in which pidginization and creolization are taken to be phenomena that provide windows on language evolution.[3] The work by Kegl and others is interesting in that it suggests parallels between the development of homesigns, the development of non-signed pidgins and creoles, and the evolution of language. Exploring these parallels fits naturally into the work called for in Aspect (2)(f)(i): considering to what extent the view "from" some window on the evolution of F is congruent with those "from" other windows on the evolution of F. Such exploratory work could well be extended to windows provided by other restricted linguistic systems: windows, say, "from" the linguistic systems acquired naturally by adult second-language learners,[4] "from" historically early non-grammaticalized language,[5] or "from" agrammatic aphasic language.[6]

8.   Wrapping up on a recursive note

In closing: syntacticians who are interested in the evolution of recursion may wish to consider adopting the Windows Approach in their study of this phenomenon. And they may wish to consider the possibility of constructing a homesigns window on the evolution of recursion. If they decided to do this, they would have to consider questions such as the following:

(5)   (a)   What can be inferred about the evolution of recursion from the fact that it is a (resilient) property of homesigns?[7]

        (b)   What can be inferred about the evolution of recursion from the fact that deaf children do not display a bias in how the redundancy introduced by recursion in homesigns is reduced?[8]

        (c)   What can be inferred about the evolution of recursion from the way(s) in which the properties displayed by recursion in homesigns are (not) affected by creolization?

These questions are presented here purely for their illustrative value. It may well be that nothing about the evolution of recursion can be inferred from the properties which

recursion has in homesigns and/or in the creoles into which homesigns develop.[9] To be able to assess the heuristic potential of a homesigns window – or any other window on language evolution – what is required is work of a substantive sort. And a core part of such work will involve coming to grips with the ways in which the first emergence and subsequent development of language could not have been similar to the creation and further development of home sign systems. For, ultimately, it is nature and extent of these dissimilarities that will determine the quality of the view offered by a homesigns window on language evolution.

Notes

1.   Goldin-Meadow's views on the first similarity between the two environments are echoed by Kegl and McWorther (1997, p. 16), Kegl, Senghas and Coppola (1999, 204), Ragir (2002, p. 272), Senghas and Coppola (2001, p. 323), and Slobin (2003, p. 13).

2.   See, for example, Kegl, Senghas and Coppola (1999), Senghas (1995, 2000), Senghas and Coppola (2001), Senghas, Coppola, Newport and Suppla (1997), Goldin-Meadow (2002, 2003).

3.   See, for example, Bickerton (1981, 1990), Bakker (2003).

4.   See, for example, Klein (2001), Perdue (2003).

5.   See, for example, Heine (2003), Heine and Kuteva (2002).

6.   See, for example, Jackendoff (1999, 2002), Haverkort (2003).

7.   For the properties of recursion in homesigns, see, for example, Goldin-Meadow (1982, 2002, p. 349, 2003, pp. 115-123). Deaf children form complex sentences by conjoining two or more propositions (as in (i)), or by embedding in a first proposition a second qualifying or restricting proposition (as in (ii)):

   (i)   BLOW—GO FORWARD

   "Marvin (the signer) had just blown a bubble (proposition 1) and then the bubble went forward in the air (proposition 2)." (Goldin-Meadow, 2003, p. 116)

   Goldin-Meadow uses the following figure to illustrate the gestures performed by Marvin in producing the sentence "BLOW—GO FORWARD":
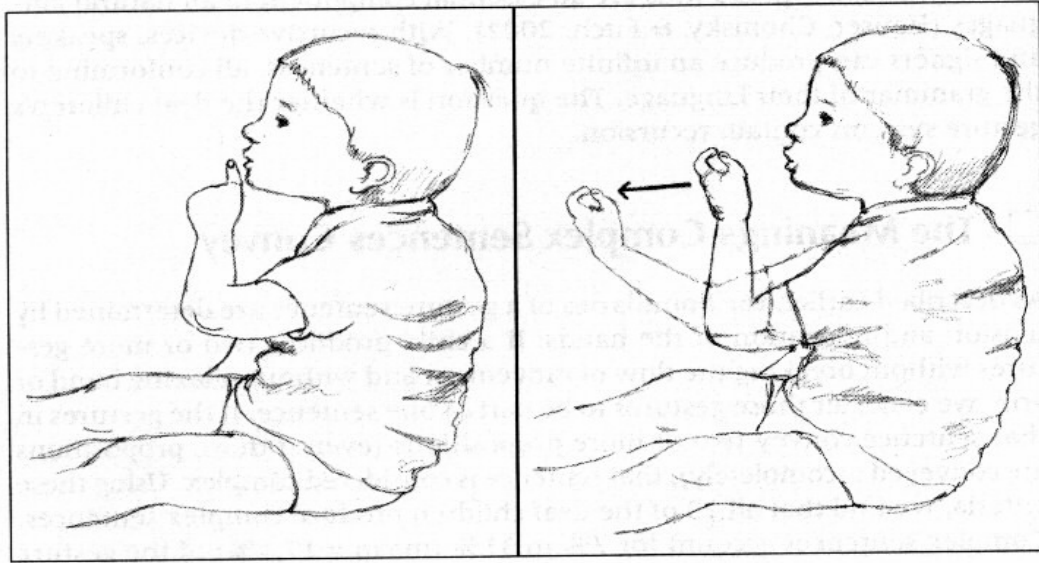
FIGURE 13. The Deaf Children Can Convey More Than One Proposition in a Gesture Sentence. Marvin holds his index finger at his mouth as though blowing on a bubble wand. Without breaking his flow of movement, he then forms his hand into an "O" shape which he moves away from his mouth, thus representing the bubble as it is blown forward. Marvin had concatenated two propositions into a single gesture sentence: *I blow bubbles* and *bubbles go forward. (*Goldin-Meadow, 2003, p. 116)

(ii)   ROUND—penny—David

"Give David (the signer) the penny (proposition 1) *which* is round (proposition 2)."

8.   For the way in which such redundancy is reduced in homesigns, see Goldin-Meadow (1987). Goldin-Meadow (2003, p.122) observes in this connection that English-learning children prefer to produce and imitate complex sentences in which the element that can be reduced (i.e., the null element) is to the *right* of the expressed element (e.g., "frogs jump and Ө catch flies") rather than to the left (e.g., "frogs Ө and kangaroos *jump*"). Japanese-learning children, by contrast, prefer complex sentences in which the reduced or null element is to the *left* of the expressed element. A homesign user who is not exposed to any language model, however, shows neither the (right-branching) bias of a child learning English nor the (left-branching) bias of a child learning Japanese. Right or left branching is a fragile property of language requiring a language model to develop.

9.   To be able to judge the heuristic potential of homesigns as a window on the evolution of recursion, one would need an in-depth analysis of the properties that recursion has in homesign systems. Such an analysis, in turn, presupposes an adequate general theory of what recursion is as opposed to other, superficially related, syntactic processes. Roeper (2004) has shown in a concrete way that, in the absence of an adequate general theory of recursion, it is impossible to give an account of the evolution of recursion.

References

Bakker, P., 2003. Pidgins: What can they teach us about the genesis of human language? Paper presented at the NIAS Seminar on "Windows on Language Genesis, 7-8 November 2003, Wassenaar.

Beerbohm, M., 1946. *Mainly on the Air*. William Heineman, London etc.

Bickerton, D., 1981. *Roots of Language*. Karoma Publishers, Ann Arbor.

Bickerton, D., 1990. *Language and Species*. University of Chicago Press, Chicago.

Botha, R.P., 2003. *Unravelling the Evolution of Language*. Elsevier, Amsterdam etc.

Botha, R.P., 2004a. Windows on language evolution: What are they and Wherein lies their virtue? *Stellenbosch Papers in Linguistics* 35, pp. 1-21.

Botha, R.P., 2004b. Windows on language evolution: How are they constructed? *Stellenbosch Papers in Linguistics* 35, pp. 23-41.

Goldin-Meadow, S., 1982. The resilience of recursion: a study of a communication system developed without a conventional language model. In: Wanner, E., Gleitman, L.R. (Eds.), *Language Acquisition: The State of the Art*, Cambridge University Press, Cambridge, pp. 51-77.

Goldin-Meadow, S., 1987. Underlying redundancy and its reduction in a language developed without a language model: Constraints imposed by conventional linguistic input. In: Lust, B. (Ed.), *Studies in the Acquisition of Anaphora, Volume II, Applying Constraints*, D. Reidel Publishing Company, Dordrecht etc., pp. 105-133.

Goldin-Meadow, S. 2002. Getting a handle on language creation. In: Givón, T., Malle, B.F. (Eds.), *The Evolution of Language out of Pre-language*, John Benjamins Publishing Company, Amsterdam/Philadelphia, pp. 343-355.

Goldin-Meadow, S., 2003. *The Resilience of Language. What Gesture Creation in Deaf Children Can Tell Us About How All Children Learn Language*. Psychology Press, New York and Hove.

Haverkort, M., 2003. The evolution of language: A neurolinguistic perspective on the adaptation-exaptation debate. Paper presented at the NIAS Seminar on "Windows on Language Genesis", 7-8 November 2003, Wassenaar.

Heine, B., 2003. A grammaticalization window on language genesis. Paper presented at

the NIAS Seminar on "Windows on Language Genesis", 7-8 November 2003, Wassenaar.

Heine, B., Kuteva, T., 2003. On the evolution of grammatical forms. In: Wray, A. (Ed.), *The Transition to Language*, Cambridge University Press, Cambridge, pp. 376-397.

Jackendoff, R., 1999. Possible stages in the evolution of the language capacity. *Trends in Cognitive Science 3(7)*, pp. 272-279.

Jackendoff, R., 2002. *Foundations of Language: Brain, Meaning, Grammar and Evolution.* Oxford University Press, Oxford.

Kegl, J.A., McWorther, J., 1997. Perspectives on an emerging language. In: Clark, E.V. (Ed.). *Proceedings of the Twenty-eighth Annual Child Language Research Forum*, Published for the Stanford Linguistics Association by the Center for the Study of Language and Information, pp. 15-38.

Kegl, J., Senghas, A., Coppola, M., 1999. Creation through contact: Sign language emergence and sign language change in Nicaragua. In: DeGraff, M. (Ed.), *Language Creation and Language Change. Creolization, Diachrony, and Development*, MIT Press, Cambridge, Massachusetts and London, pp. 179-237.

Klein W., 2001. Elementary forms of linguistic organization. In: Trabant, J., Ward, S. (Eds.), *New Essays on the Origin of Language*, Mouton de Gruyter, Berlin, pp. 81-102.

Perdue, C., 2003. Early learner varieties: A window on language genesis. Paper presented at the NIAS Seminar on "Windows on Language Genesis", 7-8 November 2003, Wassenaar.

Ragir, S., 2002. Constraints on communities with indigenous sign languages: Clues to the dynamics of language genesis. In: Wray, A. (Ed.), The *Transition to Language*, Cambridge University Press, Cambridge, pp. 272-294.

Roeper, T., 2004. Recursion, quotation and representation. Comments made in The Internet Workshop on "Coevolution of Language and Theory of Mind". http://interdisciplines.org/coevolution.papers.

Senghas, A., 1995. The development of Nicaraguan Sign Language via the language acquisition process. *Proceedings of Boston University Conference on Language Development 19*, 543-552.

Senghas, A., 2000. The development of early spatial morphology in Nicaraguan Sign Language. *Proceedings of Boston University Child Language Development 24*, 696-707.

Senghas, A., Coppola, M., 2001. Children creating language: How Nicaraguan Sign Language acquired spatial grammar. *Psychological Science 12*, 323-328.

Senghas, A., Coppola, M. Newport, E.L., Suppalla, T., 1997. Argument structure in Nicaraguan Sign Language: The emergence of grammatical devices. *Proceedings of Boston University Child Language Development 21*, 550-561.

Slobin, D.I. 2002. Language evolution, acquisition and diachrony: Probing the parallels. In: Givón, T., Malle, B.F. (Eds.), *The Evolution of Language out of Pre-language*, John Benjamins Publishing Company, Amsterdam/Philadelphia, pp. 375-392.

Slobin, D.I., 2003. From ontogenesis to phylogenesis: What can child language tell us about language evolution? In: Langer, J., Parker, S.T., Milbrath, C., (Eds.), *Biology and Knowledge Revisited: From Neurogenesis to Psychogenesis*, Lawrence Erlbaum Associates, Mahwaw, N.J.