TWO CASE STUDIES IN LANGUAGE ACQUISITION: EVOLUTION, EFFICIENT COMPUTATION, AND LEARNABILITY

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Abstract. The present paper discusses the acquisition and learnability problems with the Japanese *sika-nai* construction and the well-known English *wanna*-contraction phenomenon with special reference to the current concern over the "evolution of language" and the long-standing desirability of efficient computation. Assuming with Frampton and Gutmann (1999, 2002) that only their crash-proof cyclic computation can be efficient computation for human language in its most interesting sense, the present paper shows in the empirical domain of acquisition/explanatory adequacy that only a crash-proof computational system can ensure the learnability of the Japanese and English constructions to be discussed in the text.

1. Introduction

The acquisition and learnability problems with the Japanese *sika-nai* construction (see Tanaka 1997) and the well-known English *wanna*-contraction phenomenon will be discussed in this paper with special reference to the current concern over the evolution of language and the long-standing desirability of efficient computation. The ensuing dis-

cussion will be couched in the general framework of the Minimalist Program (Chomsky 2000, 2001, 2004, 2005a,b), Frampton and Gutmann's (1999, 2002) "crash-proof" project turning out to be relevant to our discussion, specifically in dealing with the problems of efficient computation and of evolution of language.

I adopt in this paper perhaps one of the strictest versions of sets of requirements for a learnability theory; i.e., a successful learnability/ acquisition theory has to fulfill the following four criteria: (i) descriptive adequacy; (ii) explanatory adequacy; (iii) efficient computation; and (iv) the ontology of language. The third criterion of "efficient computation" here should be understood in terms of Frampton and Gutmann's (2002) "crash-proof program" to the effect that the computational system generates only grammatical outputs, and the final, most pertinent criterion is concerned with Chomsky's (2004) question of why the properties of language are that way, with special emphasis on the faculty of language in the narrow sense (FLN; see below). This final question can only be considered in evolutionary terms.

The vocabulary of the faculty of language in its narrow sense (FLN; see Hauser, Chomsky, & Fitch 2002) and constraints internal to FLN (in the form of efficient computation) that reflect the interface conditions (which are presumably products of evolutionary adaptation) in the manner of Frampton and Gutmann (2002) determine the *form* of language/FLN/the computational system of human language (C_{HL}). The current understanding of the art would claim that FLN itself (with its sole property of "recursion") may not be a product of adaptation, specifically, not the notion of recursion (Hauser, Chomsky, & Fitch 2002). Already ripe enough interface properties that were arguably products of evolution (Chomsky 2002; Hauser, Chomsky, & Fitch 2002)

somehow came at some stages of evolution to be closely interconnected with FLN, which "may have evolved for reasons other than language" (Hauser, Chomsky, & Fitch 2002: 1569)/" is essentially inserted into already existing external systems" (Chomsky 2002: 108), thus explaining the *formation* of FLN properties and inviting an *evolutionary* interpretation of Chomsky's (2000, 2001, 2004) strong minimalist thesis (SMT).

2. Some General Discussion

Assuming based on Frampton and Gutmann (1999, 2002) that an instance of syntax can be said to be computationally efficient if it is able to cyclically deal with everything that is imposed on it by interfaces, I explore the feasibility of constructing such a computationally efficient syntax (see also Chomsky 2005a). Perhaps, the superficial observation should be that efficient computation may be hard to obtain precisely due to the assumption of the strong minimalist thesis (SMT; Chomsky 2000, 2001, 2004) since the task of accomplishing it would be considerably complicated by the presence of a variety of interface conditions that the faculty of language in the narrow sense (FLN) in the sense of Hauser, Chomsky, and Fitch (2002) must satisfy.[1] But we are forced to see that the actual fact is that we easily come by efficient computation *in spite of* the SMT. This is crucially where the notion of usability may come into play, FLN being usable on the part of interfaces (which is actually due to the SMT).

Why can FLN be used by interfaces? Because it reflects interface properties. Why does FLN reflect interface properties? It seems at the current level of understanding of the art that one of the most promising solutions to this problem should be Frampton and Gutmann's

(2002) explicit claim for redundancy in the sense that the same properties as interface conditions *are* realized in FLN as well (perhaps, with the association between them created innately). Frampton and Gutmann (2002) go on to suggest that it should be only their framework that could *explain* the form of FLN (in terms of evolution) on the assumption that interfaces are products of evolution (Chomsky 2002). The presence of something like the notion of redundancy here may be virtually implicit in the assumption of the SMT, but it may still be hard to resist the long-standing scientific notion of Occam's razor. Frampton and Gutmann's (2002) claim for redundancy of the sort mentioned can be said to be a realization of Chomsky's SMT in its strongest form, and it may have another virtue of having the notion of "bootstrapping" derived from this kind of redundancy/SMT. Frampton and Gutmann (2002: 94) observe that the θ-criterion (as a case of redundancy noted) may be imposed derivationally, the interface system still requiring that the representations it is presented with satisfy the θ-criterion. Frampton and Gutmann (2002) are not quite explicit about the vocabularies in terms of which these notions are expressed in each component, but I would assume that they are most profitably expressed in terms of whatever vocabulary the relevant component may have as its defining device. And I would like to generalize this notion of redundancy to the case of bootstrapping in general. Let us see a simple, basic example. The semantic/cognitive interface notion of "thing" is innately associated with the FLN notion of "noun" (N), thus stipulating the *form* of FLN (though the FLN vocabulary may be given independently). It may thus follow that the notion of redundancy noted plays a major role in the form of bootstrapping in the child's task of parameter setting/language acquisition, the direction in

this case being from the directly accessible interface notion of "thing" to the directly inaccessible FLN notion of N (see Suzuki 2002).

Let us then recapitulate the accomplishment that the child brings forth through bootstrapping. As Weissenborn and Hohle (2001) notes, the central assumption behind the bootstrapping approach to language acquisition is that there is a systematic relationship between properties of the input at one level of representation, which the learner already has access to, and another level of representation, which is arguably too abstract for her to have access to. Roughly, the typical acquisitional situation should be like the following: the child can have access to entities pertaining to interfaces (meanings, sounds, signs, etc.), whereas she cannot have access to FLN, which Hauser, Chomsky, and Fitch (2002) assume to be the only uniquely human component of the faculty of language (despite the biological situation where humans are innately endowed with it as part of the human faculty of language). Exactly here arises the problem of usability (of FLN on the part of interfaces; Chomsky 2000, 2001, 2002, 2004; see also Suzuki 2002, 2005). It may seem that the very first instances of usability of FLN in the task of language acquisition should play a very important role in "parsing" of such meanings, sounds, signs, and so forth as are assumed here to be accessible to the child (see Fodor 1998). Fodor (1998) gives a major significance to parsing in the task of parameter setting/language acquisition (see Suzuki 2002). Then it may follow that the child can have access to entities relevant to interfaces *only through channels regulated by properties of FLN*. Suzuki (2002) assumes that UG associates every parameter with a bootstrapping mechanism (in the fashion of Dresher and Kaye 1990 and Dresher 1999, with differences between cues and bootstrapping mechanisms). Taking bootstrapping as trigger, Suzuki

(2002) goes on to observe that the SMT would take parameter setting/ language acquisition by means of bootstrapping with the status of trigger to be a guarantee for FLN to become optimal in respect of interfaces, parameters lacking accessibility thanks to the deductive system of FLN and bootstrapping arguably being readily available to the leaner. But the problem here seems to be that FLN, which must arguably be inaccessible to the child presumably due to its deductive properties, may already be playing a role in her parsing interface entities in her very first task of parameter setting/language acquisition (see above) in a way that quite strongly points to the innately specified close association between FLN properties and their interface counterparts. Hence, the whole picture may be that the child can only have access to interface entities with FLN-regulatory properties innately incorporated in them, but not (directly) to FLN properties themselves. Interface entities with no innately specified FLN properties might be just noises to the learner, but I doubt the existence of such interface entities without FLN properties. It follows then that every instance of linguistically significant access to an interface entity on the part of the child must lead to her identification of the FLN property residing in it. This sort of identification should constitute the whole empirical content of parameter setting/language acquisition (somehow in rather ideal terms). Returning to the notion of usability itself, the current phrasing of the notion seems to be the stipulation that the surprising chance of FNL being used for interface (and other) purposes may be unavoidable consequences of Chomsky's strong minimalist thesis (Chomsky 2000, 2001, 2004). At the core of the language fact is FLN. The situation is quite intriguing in view of the possibility noted above of efficient computation (for which FLN should be responsible) being

interfered with *by the SMT*. So we see a unique tension in the presence of the SMT: (i) FLN is usable thanks to the SMT; but (ii) the SMT may stand in the way of its smooth operation. Notice that the SMT is a *hypothesis*, and perhaps the most interesting form that a hypothesis could take should be its most radical version, if only for the purpose of guaranteeing falsifiability. And I claim that Frampton and Gutmann's (2002) "crash-proof" framework incorporating redundancy of the sort mentioned above should be the strongest (hence, most interesting) realization of Chomsky's SMT. As already noted above, it seems that it is only their (2002) framework that can arguably explain the form of FLN (in terms of evolution), thus giving a tentative answer to Chomsky's (2004: 105) question of "seek (ing) a level of explanation deeper than explanatory adequacy, asking not only *what* the properties of language are but also *why* they are that way." Explanation in the specific case of Frampton and Gutmann's (2002) framework would be in terms of evolution, the validity of which direction will be subjected to further research.

Overall, the SMT has already long been anticipating something like bootstrapping in the field of language acquisition (as Chomsky 2000 claims that it is also applicable in all empirical domains other than interfaces), and Frampton and Gutmann's (2002) framework incorporating redundancy of the sort noted may guarantee Suzuki's (2002) system based on Dresher and Kaye (1990) and Dresher (1999) (with noted differences) that posits innate association between parameters and bootstrapping mechanisms. I have already tentatively described above the (ideal) situation with parameter setting/language acquisition, with special emphasis on the child's identification of FLN properties through encountering linguistically significant interface entities/

bootstrapping mechanisms (during the critical period).

3. Two Cace Studies in Learnability

3.1 Learnability of the Sika-Nai Construction in Japanese

3.1.1 Some naïve considerations

Assuming the standard generative acquisitional framework where there are two factors playing a major role (i.e., the genetic endowment and after-birth stimulus) in the fascinating feat of human language acquisition, the first move toward the exploration of the task of acquisition should be an attempt to detect and differentiate the nature and nurture parts of a given acquisitional phenomenon. Our first after-birth observation of the language learner concerning the *sika-nai* construction would show that she may sometimes encounter such commonplace Japanese sentences containing *sika-nai*:

(1) a. Boku-wa ima 100-*en-sika* motte-*nai*.
I-TOP now 100 yen-FOC have NEG
'I have only 100 yen.'
b. Jeong-Shik-wa gengo-gaku-*ni-sika* kyoumi-ga *nai*.
-TOP linguistics-DAT-FOC interest-NOM NEG
'Jeong-Shik is interested only in linguistics.'
c. Mary-*sika* sonokoto-o sira-*nai*.
-FOC that thing-ACC know NEG
'Only Mary knows that.'
d. Watasitati-wa Seoul-eki-de-*sika* awa-*nai*.
we-TOP Seoul station at-FOC meet NEG

'We meet only at Seoul Station.'

  e. Kankoku-dorama-wa mada Fuyu-no-Sonata-*sika* mite-*nai*-no?

     Korean dramas-TOP yet   Winter Love Song-FOC see NEG Q

     'As for Korean dramas, have you seen only the Winter Love Song yet?'

It may be quite plausible that on the basis of everyday positive stimuli such as (1a-e) above the child constructs a (tentative) 'rule' like the following:

(2) *Some formulations of the putative child's rule (after birth) for* sika-nai

  a. Attach *nai* to a predicate and *sika* to another element in the sentence.

  b. Attach *sika* to an element in the negative sentence.

  c. You can use *sika* in a negative sentence.

Recapitulating (part of) what has been repeated many times in the literature (primarily, in the context of criticizing behavioral scientific approaches to first language acquisition) in connection with this sort of observational rules of acquisition, it can be said in regard to (2a) that since the rule is necessarily observational, it may not be possible for the child to determine that you cannot obtain grammatical sentences containing a *sika*-phrase without also containing the negative marker *nai*, it being impossible to establish (solely based on positive data) that it is not the case that the very next sentence that the child may hear will contain only *sika*. That is, the child will not know forever the ungrammaticality of such examples as "*100-en-*sika* motte-iru" (100 yen-

FOC have), for example, on the basis of positive data alone. Given the independently necessary assumption of the acquisition of whatever may correspond to the 'negative clause,' we may reformulate the relevant child rule as (2b). But as long as (2b) remains to be an observational rule based on positive data such as (1a-e), it must encounter the same sort of learnability problem as (2a) does. The same argument may apply to the rule formulation in (2c), making it an implausible rule for the acquisition of the *sika-nai* construction in Japanese.

Some ungrammatical examples in this connection that may be compatible with (2a), for example, may be as follows:

(3) a. *Rin-*sika* Machiko-ga   sira-*nai*   hon-o   katta.

      -FOC   -NOM know NEG book-ACC bought

    'Only Rin bought a book that Machiko knows.'

  b. *Megumi-*sika* Sannomiya-ni itta toki Mayumi-wa

        -FOC   -LOC went when   -TOP

    ie-ni   i-*naka*-tta.

    home-LOC be NEG PAST

    'When only Megumi went to Sannomiya, Mayumi was at home.'

  c. *Ryo-wa Rumiko-*sika* Kanashiki-Koiuta-o yonda-ka-dooka

        -TOP   -FOC Sad Love Story-ACC read   whether

    sira-*nai.*

    know NEG

    'Ryo knows whether only Rumiko read the Sad Love Story.'

And it may be easy to see that the rule formulations in (2b,c) also allows (3b,c) to be generated. This fact alone should be sufficient to prove that first language acquisition cannot be accomplished solely on the

basis of the nurture part (after-birth stimuli). So let us try to provide our explanation of the Japanese *sika-nai* construction with an instance of (part of) the genetic endowment (the nature part) relevant to this expression, like the following:

(4) *A formulation of the putative innate principle relevant to* sika-nai
    Sika and *nai* are clausemates.

Assuming that clausemates share every clause, we can easily rule out the ungrammatical examples in (3a-c).

Note that I assume with Tanaka (1997) that the following examples, where we see an instance of long-distance relation between *sika* and *nai*, are sufficiently grammatical (despite some awkwardness felt in judgment on the part of my several Japanese informants and me):

(5) a. ?Mary-wa   John-ga   hon-*sika* katta-to   iwa-*naka*-tta.
           -TOP   -NOM book-FOC bought COMP say NEG PAST
        'Mary said that John bought only a book.'
    b. ?Jeong-Shik-wa   Jee-Eun-*sika* Chomsky-o   yondeiru-to
             -TOP   -FOC   -ACC read PROG COMP
       omowa-*nai*.
       think NEG
       'Jeong-Shik thinks that it is only Jee-Eun who is reading Chomsky.'

Notice that our solution to the explanation of the acquisition of the *sika-nai* construction in Japanese based on the child's rules in (2a-c) (the nurture part) and the innate "clausemate" principle in (4) (the na-

ture part) (henceforth, SOLUTION (I)) cannot explain the grammaticality of (5a,b) since *sika* and *nai* are not clausemates in these sentences, thus failing to satisfy even the fairly initial criterion of descriptive adequacy (a case of undergeneration as far as the data above go).

3.1.2 A more principled account

Let us try and construct an account of the *sika-nai* data above that can better fulfill the following four criteria of a successful learnability theory (which naturally coincide with those that a theory of language/-grammar must satisfy, given the overall goals of the present framework): (i) descriptive adequacy; (ii) explanatory adequacy; (iii) requirement of efficient computation; and (iv) the ontology of language. The first two criteria ((i) and (ii)) should be familiar from Chomsky's (1965) discussion of linguistic theory and language acquisition. As far as the criterion in (iii) goes, I here limit the discussion to the "nongeneration of ungrammatical outputs by the computational system" in the sense of Frampton and Gutmann's (2002) crash-proof system, at the same time naturally presupposing the validity of the No-Tampering Condition, for example (e.g., Chomsky 2005b), in dealing with the problem of efficient computation in general. The final, most pertinent criterion (iv) may point to the importance of Chomsky's (2004) question of *why* language/FLN/C_{HL} is what it is, the most promising approach imaginable now to the problem somehow requiring an answer in terms of evolutionary theory given the overall biolinguistic nature of the framework.

3.1.2.1 On the nature of after-birth child's rules

Before getting to the more principled account of the acquisition problem, some remarks on the naive formulations of the putative after-birth child's rule for the expression *sika-nai* (see (2a-c)) may be in order here. The standard assumption in the acquisition literature has long been that all that the learner has to do in her task of language acquisition is to set the UG-provided parameters in the direction of the language she is exposed to during the critical period, apart from the obvious necessity of the acquisition of the lexicon of the language in question. Thus, it seems to be the case that parameter setting or parameter choice through grammar competition in the sense of Yang (2002) and the acquisition of the lexicon constitute the whole empirical content of language acquisition. Assuming the validity of the functional parametrization hypothesis (FPH; Borer 1984, Fukui 1986, Atkinson 1992), which restricts the application of parameters to the functional domain of the lexicon, we see an overall picture where parameter setting is responsible for a subset (or, perhaps, all) of the functional domain (especially, in regard to formal features), the rest of the lexicon being handled by whatever procedures are involved in the "acquisition of the lexicon." I would presume that what procedures are involved may be identical both in parameter setting and the acquisition of the lexicon in general. Overall, I claim from the discussion so far that all that what is called language acquisition is concerned with should be just the lexicon/lexical items. We then obtain the following natural condition in regard to the nurture part of the acquisition problem:

(6) *Lexical condition on language acquisition*

The child's language acquisition after birth is only concerned with the lexicon/lexical items.

It may follow that putative after-birth child's rules must be subject to the condition on language acquisition in (6). We then easily see from above that the putative after-birth child's rules in (2a-c) that arguably constitute the nurture part of SOLUTION (I) cannot be admitted to be part of what the child acquires after birth. The rules (2a-c) could be "cultural" rules of some sort that some version of the "general learning strategy (GLS)" might handle, somehow being quite similar to such social rules as "You can cross the road when the signal is at green." But they may not be possible *biological* rules, definitely not the type of rules that the child could acquire as part of her after-birth language acquisition during the critical period.

3.1.2.2 The nurture part

Let us now turn to the nurture part of our new solution to the acquisition problem. In view of the lexical condition on the nurture part of first language acquisition in (6), I propose the following as the after-birth part of acquisition for our second solution to the acquisition problem (henceforth, SOLUTION (II)):

(7) *A formulation of the putative after-birth child's rule for* sika

Sika is a negative polarity item (NPI).

Note that I omit here the discussion of possible treatment of the negative marker *nai*, given the independently necessary assumption of the acquisition of whatever may correspond to the notion of negation (see the discussion concerning (2b,c)). The after-birth rule in (7) is one for the Japanese lexical item *sika*, satisfying the lexical condition on language acquisition in (6) and thus counting as a possible biolinguistic rule that the child can *acquire* after birth. (Notice that (7) primarily deals with part of the narrow syntactic/formal features of *sika*, abstracting away from the treatment of its semantic and phonological features.)

3.1.2.3 Bootstrapping and the nature part

But a certain amount of complication may arise in connection with the status of NPIs in the formulation in (7). I assume that NPI is an FLN notion inaccessible to the learner as such, no positive evidence alone enabling her to have access to it (see the discussion above concerning the notion of bootstrapping). It should be exactly in cases such as this that bootstrapping (semantic, here) comes into play to help the learner get over difficulties of this sort, being an innately specified biological device that somehow provides her with a bridge of some sort making possible the association between an interface property arguably accessible to her and an FLN one inaccessible to her. Notice that although we are discussing here the nurture part (7) of our SOLUTION (II), the acquisition of (7) cannot possibly be accomplished without something innate, given the innate nature of bootstrapping. Actually, the major part of language must be based on a variety of innate properties (i.e.,

UG), the standard assumption for some time having been that FLN/UG provides general properties of the lexicon as well as innate grammatical principles (Suzuki 2001: 19). Let us see the case of NPI in (7) and consider some possible workings of a bootstrapping mechanism.

(8) a. The semantic notion of "narrowness," "fewness," etc.

   b. The notion of NPI.

Roughly, (8a) is a (semantic) interface property, whereas (8b) is an FLN notion. My claim here is that (8a) and (8b) are innately closely connected with each other, and I call connection of this sort "bootstrapping." Recall that (8a) may be a product of evolution (Chomsky 2002), and I would presume that FLN, which existed not necessarily for communication/language purposes at some time of evolution (Hauser, Chomsky, & Fitch 2002), somehow evolutionarily came to be interconnected with products of evolution such as (8a), possibly due to the nearness and neural interconnectivity between the interface components and FLN in the human system (all of which should be the basis on which to motivate an evolutionary interpretation of the SMT in the sense that the concept (i.e., SMT) should have been instrumental in the formation of FLN properties in evolutionary terms of mutation, adaptation, or whatever). The FLN notion in (8b) should have come to exist as a result of evolutionary neural interconnectivity of the sort above between an interface and FLN, thus describing some part of the workings of the SMT. Recall that in Japanese the semantic notion in (8a) is typically instantiated/realized as part of the meaning of such lexical items as *sika, mo, zenzen,* and so forth; some examples that contain *mo* or *zenzen* are as follows:

(9) a. Rin-wa   tiisai- toki eigo-ni   sukosi-*mo* kyoomi-ga

-TOP small when English-in few-FOC   interest-NOM

naka-tta.

be NEG PAST

'Rin was not interested in English at all when he was small.'

b. Atarasii kurasu-ni hitori-*mo*   siriai-ga   i-*nai*.

new   class-in   one person-FOC acquaintance-NOM be NEG

'I have no acquaintances in the new class.'

c. Saikin-no   Rosia-no   seizyoo-nituite-wa   *zenzen*

recent-GEN Russia-GEN political situation about-TOP at all

sira-*nai*.

know NEG

'I don't know the recent political situation in Russia at all.'

Notice that all these lexical items with the meaning in (8a) appear in a negative clause, requiring the presence of the negative marker *nai* in a neighborhood of some sort (to be made precise below). More important here should be the observation that they all appear to be forced to come under the control of the relevant bootstrapping mechanism, that is, the one that (innately) connects the semantic notion of narrowness, fewness, etc. (8a) and the FLN concept of NPI (8b), presumably due to the fact that they all happen to have the relevant meaning in (8a). And I claim that the bootstrapping mechanism pertaining to (8a,b) springs into action once the learner identifies the lexical item in question as having the pertinent meaning (8a), thus enabling her to somehow "leap" from the semantic notion (8a) accessible to her to the FLN concept (8b) inaccessible to her as such. This must be the (biological) moment when the learner has (just) acquired the relevant lexical item in

Japanese, given the availability/acquisition of all the other ingredients (e.g., phonological properties) needed to make its acquisition established in a linguistically significant sense. Notice that it is the task of bootstrapping to enable the learner to reach an FLN notion through an interface property, and no more. The content of the relevant FLN notion should be innately given. As for the case of (7) and (8) above, I assume the innately given content of the FLN notion of NPI to be like the following, which should constitute the nature part of our SOLUTION (II) for the acquisition of the Japanese expression *sika-nai:*

(10) *A formulation of the putative innate NPI principle*
      An NPI is in a local relation with a negative element.

Note that the content of the relevant notion is given in the form of a licensing condition, presumably thanks to the deductive nature of FLN notions/UG. And I here limit the discussion to relations of NPIs with negative elements, and largely abstract away from the precise identification of the notion "local," apart from sporadic remarks below to that effect. As noted above, bootstrapping may only function to the extent that the learner has (just) succeeded in having access to the FLN concept of NPI (in this case). Given the inaccessibility of the content of (10), the whole of which must largely consist of a variety of arguably inaccessible FLN entities plus some version of implicational (sentential) structure that may underlie the proposition in (10) (see Fodor 1983: 3-10 for the role and relevance of propositional contents in Chomsky's theorizing), how then can the learner go on to *grasp* the content of the NPI principle in (10) and to *perform* according to its instructions ("brainwise," though, as is usual with this kind of discussion)? Noting that

this should be a quite interesting problem and anticipating that it will be a long, recalcitrant one, I here simply observe that every FLN entity in (10) (and, perhaps, even the concept of implication underlying the proposition there) should need a corresponding bootstrapping mechanism reflecting a pertinent interface property in order for the leaner to succeed in having access to it. All in all, the innate NPI principle in (10) should start to function only when the learner has succeeded in having access to every FLN entity (and the concept of implication) there. (Note that functioning of this sort on the part of innate principles should be implemented as part of the learner's actual (brain-wise) linguistic behavior, in something like the fashion of Fodor's 1998 "learning by parsing"; that is, the moment of the initial functioning of the innate principle (10) as part of the learner's linguistic behavior must be that of the accomplishment of the learner's acquisition of (10).)

3.2 Learnability of the Wanna-Contraction in English

As has been done in the case of the *sika-nai* construction in Japanese above, I would like to tackle the learnability problem of the *wanna*-contraction in English by first proposing what I call SOLUTION (I) and then getting on to our final SOLUTION (II). You will see again as in the Japanese case that the former solution consists of rather naive, common-sense set of assumptions involving its nurture and nature parts while the latter may hopefully be composed of more principled assumptions. Without taking much time for the justification of the relevant assumptions (primarily due to the standard observation that they can safely be said to belong under what we usually quite naively think

young children may learn in their early years of language acquisition), I first propose (11a,b) as the nurture and nature parts for our SOLUTION (I) for the acquisition of the wanna contraction, respectively:

(11) a. *A formulation of the putative child's rule after birth for* wanna

You can pronounce *want to* (/wánt tə/) as *wanna* (/wánə/).

b. *A formulation of the putative innate principle relevant to* wanna

Want to can be contracted to *wanna* only if X = (phonologically) null in "*want X to.*"

Notice that the nurture part in (11a) seems to be a phonological rule, apparently being quite easy to acquire. But conceptually, the crucial problem with an after-birth child's rule is not so much concerned with its surface ease vs. difficulty (presumably, according to some obscure measure in terms of general learning abilities) as with the criterion in terms of the lexical condition on language acquisition in (6), which I believe should define the possible range of biological rule application (within the bounds of the critical period), presumably with the consequence of the neurophysiology of the organism ensuring that what is acquired through biological rules will be stored wired in the brain throughout the learner's life. It should be rather clear that the putative child's rule after birth in (11a) may not be a possible biological one as it violates the lexical condition on language acquisition after birth in (6), and hence a (conceptual) difficulty with SOLUTION (I).

Let us, however, reexamine how SOLUTION (I) fares in accounting for some of the standard cases frequently discussed in the literature, scrutinizing the extent to which it can satisfy the first, foremost re-

quirement of descriptive adequacy, and then see some extremely recalcitrant examples from Anderson and Lightfoot (2002) and elsewhere.

(12) a. i) I *wanna* go.

     ii) I <u>want [PRO to</u> go]

   b. i) Do you *wanna* see him?

     ii) do you <u>want [PRO to</u> see him]

   c. i) Who do you *wanna* visit?

     ii) who do you <u>want [PRO to</u> visit (who)]

   d. i) *Who do you *wanna* visit Tom?

     ii) who do you <u>want (who) to</u> visit Tom[2]

It somehow appears that Case-checked/marked elements block the contraction while others do not. Although the innate principle in (11b), as it stands, may have difficulties making a distinction between phonologically null, Case-checked elements and merely phonologically null ones, I simply assume that it can make a distinction between the two for the sake of discussion. Then let us see some extremely interesting examples from Anderson and Lightfoot (2002) and Aoun and Lightfoot (1984):

(13) a. i) *They don't *wanna* win games to be their only goal.

     ii) they don't <u>want PRO to</u> win games to be their only goal

   b. i) *They expect people who continue to *wanna* vote for the incumbent.

     ii) they expect people who continue to <u>want to</u> vote for the incumbent

   c. i) *I don't need or *wanna* hear about it.

ii) I don't need or <u>want PRO to</u> hear about it

Notice that in all the ungrammatical cases in (13a-c) the element be-
tween *want* and to is either phonologically null ((13a,c)) or simply non-
existent ((13b)), the assumptions in (11a,b) ruling all the cases in (13a-c)
in as grammatical. Our SOLUTION (I) consisting of the nurture and
nature parts in (11a,b), respectively, thus fails to predict the grammati-
cality of the examples in (13a-c), also failing to satisfy the most elemen-
tary requirement of descriptive adequacy imposed on a successful
learnability theory.

Without examining any further how SOLUTION (I), which has
failed in the first task of meeting the demand for descriptive adequacy,
fares in the further task of satisfying the remaining three criteria, let
us move on to the exposition of our SOLUTION (II) for the acquisition
of the *wanna*-contraction phenomenon in English, which we hope will
be more principled than our first solution. Let us propose the hypothe-
ses in (14a,b) as the nurture and nature parts of SOLUTION (II), re-
spectively:

(14) a. *A formulation of the putative after-birth child's rule for* wanna
         To is a clitic.

      b. *A formulation of the innate cliticization principle*
         A clitic cliticizes to its overt, phonologically adjacent host only
         if it is the phonologically highest element in the sister of that
         host.[3]

After noting that the nurture part of SOLUTION (II) in (14a) does in-
deed satisfy the lexical condition on language acquisition in (6), which

defines the concept of a possible biological(, linguistic) rule after birth, since (14a) is concerned with part of the acquisition of the English lexical item to, let us first see how the hypotheses in (14a,b) can cope with the question of descriptive adequacy in the case under discussion.

I adopt the following assumptions based on Nissenbaum (2000), Chomsky (2000, 2001, 2004), and Suzuki (2005) among others. I assume first that v*P (roughly, pertaining to transitive predicates) and CP are strong phases. As for "spell-out," I adopt Chomsky's (2000, 2001) multiple strong phase-wise spell-out and assume that "(the operation of) TRANSFER (in the sense of Chomsky 2004) hands a portion of the narrow-syntactic derivation (i.e., the complement of the head of a strong phase) over to the phonological component and to the semantic component at the completion of the strong phase, the spelled-out portion of the narrow-syntactic derivation is phonologically and semantically treated at PF and LF, respectively, and finally, the treated portion is sent back to narrow syntax from PF and from LF, respectively,[4] inviting the assumption that the resulting narrow-syntactic structure thus obtained should involve the effects of treatment both at PF and at LF, which will be carried along throughout the derivation" (Suzuki 2005: 35).[5] The whole set of assumptions here that can be considered to be a "(maximally) strengthened" version of Chomsky's (2004) notion of TRANSFER will henceforth be called the "Strengthened Mapping Hypothesis (SMH)" (see section 5.5 below for further details and developments).

Let us see the examples in (12) and (13) one by one from the viewpoint of descriptive adequacy, noting that the clitic is to and its host *want* in all the cases.[6] As for (12a), which is grammatical, we have the structure "[$_{v*P}$ I want [$_{VP}$ want [$_{TP}$ PRO to [$_{vP}$ PRO go [$_{VP}$ go]]]]]" at

the completion of the (matrix) strong v*P phase, the matrix VP being TRANSFERred to interfacing modules (specifically, to the phonological component, in this case). I assume that the operation of (innate) cliticization in (14b) applies at PF (see the case of innate binding principles applying at LF). Now, in (12aii)) the portion relevant to the rule in (14b) corresponds to "want [PRO to," where only the phonologically null pronominal intervenes between the clitic and its host and hence the clitic should be the phonologically highest element in the complement (i.e. sister) of its host (i.e., *want*), allowing cliticization to apply to (12a). Notice that I assume that after the matrix VP portion has been handed over to PF, presumably, only the PF-treated portion (due to economy considerations constraining the application of the operation; see note 5), that is, *want* with *to* cliticizd onto it (i.e., *wanna*), is sent back to narrow syntax with the consequence of modifying *want* in the head position of v*P in the due fashion (i.e., so as for it to change into *wanna* as well), thanks to the natural assumption that all copies of the same element share all features. (I largely abstract away from considerations pertaining to the application of the phonological "which-copy-to-pronounce (WCP)" rule, which determines which copy of a non-trivial chain to pronounce, throughout the exposition of the *wanna*-contraction cases, unless it is needed for expository purposes; see Suzuki 2005.) Now, the example (12b) may roughly be analyzed along the lines of (12a), with one difference between them (i.e., v*P instead of vP in the embedded clause for the former). Omitting the detailed exposition of the TRANSFER operation in the embedded clause and simply noting that the TRANSFERred embedded VP, which is marked for inaccessibility, is made visible at PF again at the completion of the matrix strong v*P phase by the strengthened PGP (see note

7 and Suzuki 2005; the PGP operation being subject economy and, perhaps, the reason in this case being the operation of the phonological WCP rule applying to the verb *see*), we obtain the structure "[$_{v*P}$ you want [$_{VP}$ want [$_{TP}$ PRO to [$_{v*P}$ PRO see [$_{VP}$ see him]]]]]" at the completion of the matrix strong v*P phase. The matrix VP undergoing TRANSFER at this stage of derivation contains the portion "want [PRO to" (see (12bii)) relevant to the phonological cliticization rule (14b), which applies successfully to (12b) to yield the contracted form *wanna*. Turning to (12c), which is a *wh*-movement case, we have the structure "[$_{v*P}$ who you want [$_{VP}$ want [$_{TP}$ PRO to [$_{v*P}$ who PRO visit [$_{VP}$ visit who]]]]]" at the completion of the matrix strong v*P phase, again omitting the structural details pertaining to the derivation of the embedded clause (see above for the discussion of (12b)). Here again the relevant portion "want [PRO to" (see (12cii)) is contained in the TRANSFERred matrix VP, innate cliticization applying successfully to (12c), as has to the two cases above. Then let us get on to the ungrammatical (12d), which is also a *wh*-movement case. Ignoring as above the structural details relevant to the derivation of the embedded clause, which also contains a strong phase, we have at the completion of the matrix strong v*P phase the structure "[$_{v*P}$ who you want [$_{VP}$ want [$_{TP}$ who to [$_{v*P}$ who visit [$_{VP}$ visit Tom]]]]]." Now, the portion relevant to cliticization is "want [who to" (see (12dii)) contained in the spelled-out matrix VP. Notice that the wh-phrase *who* between the host and the clitic is still phonologically full at this stage of the derivation where the phonological *wanna*-contraction should apply, the phonological WCP rule (relevant to *who*) applying later in the derivation. Since the phonologically highest element in the sister of the host *want* is not the clitic to, but the wh-phrase who, in (12dii)), the innate

cliticization rule in (14b) cannot successfully apply to (12d), failing to yield the contracted form *wanna* and thus ruling out as ungrammatical the example (12di)), which contains a now illicit instance of the contracted form *wanna*.

Let us now turn to the extremely interesting examples from Anderson and Lightfoot (2002) and Aoun and Lightfoot (1984) in (13a-c). Note that all the examples in (13) are ungrammatical with the host and the clitic *want to* contracted into the form *wanna*. Let us see the ungrammatical cases one by one. First, look at (13a). At the completion of the (matrix) strong v*P phase, we have the structure "[$_{v*P}$ they want [$_{VP}$ want [$_{TP}$ [$_{CP}$ PRO to win games] to be their only goal]]]," the VP portion being handed over to interfacing modules (specifically, to the PF component in this case). I here simply assume the embedded clausal subject to be a CP (see Chomsky 2000, Rackowski & Richards 2005) and abstract away from technical details pertaining to the analysis of the identificational copula construction and also from possible consequences arising from downstairs TRANSFER operations, if any. Now, the portion relevant to the application of the PF cliticization rule (14b) is "want [$_{TP}$ [$_{CP}$ PRO to." It may be the case in this portion that there intervenes no phonological material between the clitic to and its host *want*, but the former is not the phonologically highest element in the sister of the latter, it being the embedded CP which is the phonologically highest in the sister (i.e., embedded TP) of the host *want*, and, hence, the *wanna* contraction cannot apply between the verb *want* and the leftmost *to* in (13a) (with the application of the contraction rule impossible between the verb *want* and the rightmost *to* for obvious reasons of violation of the phonological adjacency requirement between the clitic and its host). The example (13b) may provide an extremely in-

teresting case where there is not even a null pronominal intervening between the clitic and its host. At the completion of the matrix strong v*P phase, we obtain the structure "[$_{v*P}$ they expect [$_{VP}$ expect [$_{TP}$ [$_{DP}$ people who continue to want] to vote for the incumbent]]]," the VP portion being subject to TRANSFER. The part relevant to the innate cliticization principle in (14b) would be "want] to," where the verb *want* is an intransitive with the meaning "to lack enough food, clothing, shelter, etc." Since the verb *want*, which should be the host here, lacks a complement (and hence, a sister, in this case), the clitic *to* cannot be in its sister in the first place, the relevant part being unable to meet the "structural description" requirement imposed on it by the rule in (14b) and thus accounting for the impossibility of the contraction in (13b). Then let us turn to our last *wanna*-contraction example (13c), which I assume to be an instance of what is called the "right node raising" operation (RNR) (see Kayne 1994: 61, 67-68). Here I simply follow some standard version of the analysis of the RNR construction, according which the RNRed portion "[$_{TP}$ PRO to hear about it]" stands at a fairly high place in the relevant configuration. Under the reasonable and natural assumption (perhaps, pertaining to possible application(s) of the phonological WCP rule in the framework countenancing the operation of multiple strong phase-wise spell-out) that it is not the copy of the embedded TP which presumably still stays as the complement of the host *want*, but its RNRed copy that is relevant to the computation of the innate cliticization principle (14b), the portion relevant to the rule (14b) should be "want (TP)]]] [PRO to" (the number of right bracket boundaries for the non-RNRed part actually depending on the analysis adopted). Here again, the clitic is not in the sister of the host (for a different reason, though), leaving impossible the application of

the cliticization rule (14b) and hence, the contraction. This concludes our discussion and exposition of a possible analysis of the (typical) *wanna*-contraction examples in (12) and (13) in terms of our SOLUTION (II) comprising the nurture and nature parts in (14a,b), respectively, from the perspective of the question of descriptive adequacy, which leads us to the following questions in regard to this contraction phenomenon of explanatory adequacy, of efficient computation, and of the explanation of the ontology of language, which I take up in sections 4.2, 5.2, and 4.2 again, respectively, along with the more detailed discussion of the Japanese *sika-nai* construction from these perspectives.

4. Four Criteria of a Learnability Theory

Now let us see how SOLUTION (II) for the acquisition of the Japanese expression *sika-nai* that incorporates the after-birth child's rule in (7) (the nurture part) and the innate NPI principle in (10) (the nature part) and again SOLUTION (II) for the learnability of the *wanna*-contraction phenomenon in English that comprises the nurture and nature parts in (14a,b) fare in satisfying the four criteria above of a successful learnability theory: (i) descriptive adequacy; (ii) explanatory adequacy; (iii) requirement of efficient computation; and (iv) the ontology of language. Firstly, the question of descriptive adequacy (only some remaining problems with the learnability of the *sika-nai* construction being taken up here, with that of the *wanna*-contraction case discussed to quite a sufficient extent (see section 3.2 above). The examples that have to be covered in this paper include (1a-e), which are

grammatical, (3a-c), which are ungrammatical, and (5a,b), which are (sufficiently) grammatical. (The result should be extended to cover (9a-c), where NPIs other than *sika* are involved.)

4.1 Descriptive Adequacy

Let us first discuss the descriptive adequacy requirement (in connection with the acquisition of the *sika-nai* construction in Japanese), beginning with the exposition of the stage(s) of development when the child has "acquired" (7) and (10). One important aspect of FLN computation may concern the concept(s) of "be in a local relation with" in the NPI principle formulation in (10). I assume that covert (phrasal) movement of some sort is involved here and that interpretation of some sorts (modification, idioms, licensing, etc.) requires relevant elements to be assembled in a sufficiently local domain (either overtly or covertly). Among pertinent examples of this sort are the following, which I here avoid in-depth discussion and analysis of:

(15) a. i) Kobara-ga   suita.

small stomach-NOM hungry PAST

'I'm a little hungry.'

ii) Kogosi-o   kagameru.

small hip/waist-ACC lower

'To lower one's hip/waist a bit.'

iii) Kogoe-de   tutaeru.

small voice-by/with communicate

'To communicate in a low voice.'

b. Which picture of himself does John think that Bill took?

The examples in (15ai)-iii)) taken from Japanese are well-known in the literature. In (15ai)-ii)), the adjective *ko*, which is somehow incorporated into the larger NP (*kobara* and *kogosi*, respectively) and hence should modify the associated NP, actually modifies the predicate (*suita* and *kagameru*, respectively). I assume that covert movement of some sort raises the adjective *ko* (which is actually morphologically incorporated into the larger NP and from whose precise analysis I here abstract away) to a sufficiently local domain containing the predicate, thus providing (15ai)-ii)) with an appropriate interpretation. Note that the example in (15aiii)), where the adjective *ko* modifies its associated NP, does not involve such covert movement for the purposes of its interpretation. The example in (15b) containing a reflexive and the idiom *take ... picture* (with the meaning of *photograph;* of course, *take* may have its literal meaning here, depending on the circumstances; see the discussion below) is discussed in Chomsky (1995), where it is pointed out that the idiom interpretation of *take ... picture* (*photograph*) can only be seen in the case in which *himself* refers to *Bill*, but not in the case where *himself* refers to *John*. You can easily see that the word string unit *take ... picture* only appears where *himself* takes *Bill* as its antecedent, the idiom interpretation somehow requiring everything that takes part in the idiom formation to be assembled in a small enough, local domain (presumably, via relevant copies, given the minimalist copy theory of movement), which corresponds to the relevant word string unit in the present case. Recall also Chomsky's (1995) treatment of reflexives in terms of LF movement, which raises the reflexive to a local domain containing its antecedent, another instance of

locality-related processes.

I assume with Richards (2001) that both overt and covert movement obey the same set of island constraints, leading to the claim that covert phrasal movement applying to the *sika-nai* construction also must observe the usual island constraints. And for expository purposes, I tentatively adopt the Rossian version of island constraints (Ross 1967), abstracting away at the same time from subtle grammatical distinctions (arising from differences between mere subjacency vs. CED vs. ECP, etc. violations; see Chomsky 1981, 1986b, 1995, 2000 2001, 2004, 2005b, etc. for various stages of the theoretical development of the notion of island constraint, including also the Minimal Link Condition (MLC) and the Phase-Impenetrability Condition (PIC) within perhaps the most recent versions of the Minimalist Program).[8] As for the landing site of covert phrasal movement applying to the Japanese *sika-nai* construction, I simply adopt for expository purposes again the rather standard assumption that the *sika*-phrase covertly raises to some Spec of the negative head *nai*, provisionally leading to the conclusion that the requisite local relation between *sika* and *nai* can be realized in terms of a Spec-head configuration.

Now on the assumption that the sika-phrase covertly raises to some Spec of the negative head *nai* so as to fulfill the locality requirement imposed on the relation between the NPI and the negative element by the nature part of our SOLUTION (II) in (10), recall that covert movement involved here must observe island constraints, as noted above. Let us here examine whether each of the *sika-nai* examples above (i.e., (1a-e), (3a-c), and (5a,b)) can satisfy the requirement in (10) in terms of the presence vs. absence of an island in its crucial configuration. We can easily see that (3b,c) are violations of island con-

straint, the *sika*-phrase in (3b,c) residing in an adjunct- and *wh*-islands, respectively, thus arguably being unable to raise to a local neighborhood containing the negative head *nai*, and hence failing to fulfill the innate NPI principle (the nature part of SOLUTION (II)). Turning to the ungrammatical (3a), where it is the negative marker *nai* which is in a (complex NP-) island and the *sika*-phrase finds itself outside the island. Since it may not be the usual practice (presumably, on some principled grounds) in the literature for the negative head to raise to the focus-phrase, which would constitute a violation of an island constraint in any case, we may resort to another independently needed UG principle, that is, some version of the so-called Proper Binding Condition. I here tentatively reformulate the condition as follows:

(16) *Proper Binding Condition*
     Movement is upward.[9]

According to the usual practice in the literature, the *sika*-phrase in (3a), which is outside the relevant island, must *lower* to some Spec of the negative head *nai*, which is inside the island, so as to satisfy the nature part of SOLUTION (II), but, of course, this move would be a violation of another UG principle in (16), leading to the ungrammaticality of the example (3a). Let us then turn to the grammatical cases in (1a-e) and (5a,b). While there are no problems with the examples in (1a-e), which are all grammatical and where no islands are involved, some remarks on the (sufficiently) grammatical (5a,b), which are cases of long-distance covert movement, may be in order, given Richards' (2001: 7) claim that "Subjacency constrains both overt and covert movement." Since covert movement also obeys the same island constraints, it

should presumably be the case that a certain amount of awkwardness of the sort that is usually detected with long-distance *wh*-movement cases must be felt in the case of (5a,b) as well, thus giving grounds for the non-full acceptability of these cases. As for how covert elements raise, I simply follow Chomsky (2000) in assuming that covert movement also proceeds by "phases" (see also Chomsky 2005b: 16 for the assumption that all operations are driven by a strong phase head). And finally, we can see quite transparently that the descriptive adequacy requirement can trivially be met with the other NPI cases in (9). Since there are no islands between the negative marker and mo in (9a,b) and *zenzen* in (9c), respectively, the covert raising of the NPI(-phrases) to some Spec of the negative head *nai* is possible, thus correctly predicting the grammaticality of the cases in (9).

4.2 Explanatory Adequacy/Learnability and Some Remarks on the Ontology of Language

It may probably appear that there should be no difficult problems involved in satisfying the explanatory adequacy/learnability requirement on the part of our SOLUTIONS (II) for the learnability of the Japanese *sika-nai* construction and for that of the wanna-contraction phenomenon in English, given the lexical condition on language acquisition in (6) to the effect that the child's language acquisition *after birth* is only concerned with the lexicon/lexical items of the language she is exposed to. I tentatively assume this strong condition on the child's after-birth language acquisition since it seems to require her to acquire only the least amount of language imaginable, given the stan-

dard assumption that the child has to acquire the lexicon of her target language *in any case.* This should be the null hypothesis in regard to the question of what the child acquires upon exposure to experience after birth, and so any departure from this would have to be empirically motivated. It should be quite transparent that both the nurture part of SOLUTION (II) in (7) for the acquisition of the *sika-nai* case that states that "*sika* is a negative polarity item (NPI)" and again the nurture part of SOLUTION (II) in (14a) for the acquisition of the *wanna*-contraction case that states that "*to* is a clitic" trivially satisfy the lexical condition (6) since they are only concerned with (part of) the lexical items *sika* and *to*, respectively.

Notice that the statements in (7) and (14a) contain the notions "NPI" and "clitic," which are arguably FLN ones. The FLN concepts of NPI and clitic are inaccessible to the learner as such, inviting her to resort to the mechanism of bootstrapping (we have already seen this above with the case of the learnability of the *sika-nai* construction in Japanese). As for the *sika-nai* case, we have seen an instance of (semantic) bootstrapping consisting of (at least) the "semantic notion of 'narrowness,' 'fewness,' etc." (8a) and the FLN notion of NPI (8b) with part of its workings. I would like to propose for the *wanna*-contraction case an instance of (phonological) bootstrapping comprising (at least) the "phonological notion of 'small, unstressed, dependent element (which can only be pronounced as part of another independent word)' and the FLN notion of clitic (see the discussion concerning (8a,b) for some bootstrapping workings). The plausible conclusion here should be that even the after-birth part of first language acquisition may involve some FLN notion the learner cannot have direct access to, requiring her to turn to the operation of bootstrapping for the purpose of

reaching it. I would claim that this situation, where the nurture part of acquisition (of a lexical item) contains an FLN notion that is in principle inaccessible to the learner, may be the rule rather than the sporadic event in the acquisition of the lexicon, which is assumed here to constitute the whole empirical content of the child's after-birth language acquisition. That is, the picture emerges where every instance of lexical item acquisition necessarily involves part of it where reference/access to FLN is required, which might presumably make it possible to involve relevant neurophysiological factors in the learner's task of first language acquisition within the limiting bounds of the critical period. Consider the simple case of the acquisition of such concrete nouns as *book*. The lexical entry of even such a simple noun contains (at least) the formal feature information indicating that *book* is a noun (N) apart from the usual semantic and phonological/signed information, N being an FLN notion and thus calling for the implementation of bootstrapping (see Pinker 1984, 1994; Bloom 1999; Suzuki 2002). This situation should be bona fide biological and thus presents extremely strong evidence that points to vast differences between biological acquisition and "learning via GLS."

Some remarks on the *acquisition* of the innate NPI principle in (10) that constitutes the nature part of SOLUTION (II) for the acquisition of the *sika-nai* construction in Japanese and of the innate cliticization principle n (14b) constituting the nature part of SOLUTION (II) for the acquisition of the English *wanna*-contraction phenomenon may be in order here. The innate principles (10) and (14b) state that "an NPI is in a local relation with a negative element" and that "a clitic cliticizes to its overt, phonologically adjacent host only if it is the phonologically highest element in the sister of that host," respectively. One important

problem with this kind of biological acquisition is naturally concerned with the question of how to obtain means of having access to resources that are within the human organism as part of her natural endowments but unavailable for her purposes as such due to their inevitable abstract nature arising from the deductive structure of the whole system that aims at accounting for all (possible) human languages, which situation I argue makes it impossible for the learner to gain (direct) access to such natural resources. But the actual fact seems to be that the child enjoys ample freedom of having access to them, which can clearly be seen in view of the abundance of learnability literature of the sort that specifically seeks to establish its argumentation in terms of the well-known "poverty of the stimulus argument," the central thesis playing a major role in the discussion of the "logical problem of language acquisition" or "Plato's problem" as it pertains to language. Then there must be means of some specific kind with a bona fide biological character that can bridge the existing gap, which I claim must be the mechanism of "innately given bootstrapping" that arguably plays a major role in enabling the learner to reach abstract FLN resources via interface properties arguably accessible to her (see Dresher 1999 and Dresher & Kaye 1990 for the original idea, Suzuki 2002; the discussion above). Formulation of a specific instance of bootstrapping in each case, of course, is an empirical matter. Turning to the acquisition of the innate NPI and cliticization principles in (10) and (14b) respectively, it should already be clear that the principles (10) and (14b) start to function only when all the relevant abstract FLN entities in them, which may include for the case of the acquisition of the NPI principle the concept of "locality" (perhaps, plus the concepts of "negation" and "propositional implicational structure," which may not belong to

language proper), apart from that of NPI (see the discussion above), and for the case of the acquisition of the cliticization principle the concepts of "cliticize" and of "host," plus those of "structural height" and of "sister/c-command" (apart from that of clitic), have been reached and identified (through bootstrapping). So we can say that the principles (10) and (14b) have been acquired by the learner when they start to function in/for her in her language *performances* of various sorts (see section 5.8 for discussion on the ontological status of grammars).

As for the fourth criterion of a successful learnability theory crucially involving the necessity of explanation of aspects of evolution that has only recently appeared on the theoretical linguistics scene (see Hauser, Chomsky & Fitch 2002, Fitch, Hauser & Chomsky 2005, among others), I simply assume more or less on conceptual grounds alone the validity of Frampton and Gutmann's (2002) "crash-proof" framework, obviously for lack of the depth/width of the current understanding of the matter. As discussed in section 2, Frampton and Gutmann's (2002) crash-proof project is an interesting attempt to construct a derivational system free from the notion of "crash" in the sense of Chomsky (1995, much subsequent work) (which aspect of their 2002 project I return to in section 5.2, which deals with the third requirement of efficient computation imposed on a successful learnability theory), concomitantly (but, presumably, independently of the crash-free thesis) requiring the double realization of the same linguistic property, both in the form of an interface condition and in the form of a computational, derivational constraint, an obvious instance of redundancy (see Frampton and Gutmann 2002 for some discussion). Which picture of the FLN-interfaces association I take, as noted, to be the realization of one of the strongest version of Chomsky's SMT.[10] Although other ver-

sions of the SMT may not be nearly as different from Frampton and Gutmann's (2002) as one might think (see Chomsky 2005b, for example), I opt for their (2002) SMT version for simple reasons of the transparency observed (i.e., in the form of "redundancy") in the FLN-interfaces/modules connection. Then the explanation of the (current) form/ontology of language/FLN may be straightforward, the latter possessing the form it now has due to (evolutionary) consequences of the FLN-modules connection derivable from the assumption of Chomsky's SMT (whose presence in our theorizing has so far had the major function of providing a strong explanatory device for the theory, but whose very existence may also somehow have to be subject to careful scrutiny; see section 2 above for more discussion on the problem(s) in question).

4.2.1 Some factual acquisitional scenarios reconsidered: With special reference to the so-called parameter setting

Under the assumption that the child's language acquisition after birth limits itself to that of the lexicon/lexical items of her target language, we have seen above that every instance of lexical (item) acquisition necessarily involves part of it where she needs to gain access to an FLN entity inaccessible to her as it is that arguably forms the formal feature part of the whole constitution of the lexical item. Some lexical item examples are the cases discussed above of *sika* (with the FLN concept of NPI) in Japanese, to (with the FLN concept of clitic) in English, and *book* (with the FLN notion of N) in English, the mechanism of bootstrapping playing a major role in allowing the learner to accomplish

the seemingly extremely difficult task of reaching the abstract FLN entity in each case. Before getting on to the discussion of possible connection between ordinary lexical items such as the ones we have so far been looking at and the so-called proper parameter setting cases extensively discussed in the literature and to the subsequent, reasonable task of uniting the two cases to form a single phenomenon (hopefully, simply a matter of lexical acquisition), I would like to establish the terminology in discussing the concept of bootstrapping. I call a "cue" (due to Dresher 19999, Dresher & Kaye 1990, with some differences in usage of specific terms) the accessible interface portion in terms of which to gain access to FLN (see (8a) and the phonological notion of 'small, unstressed, dependent element' for examples), and reserve the term "boo tstrapping" to cover the whole process of the learner reaching FLN with the aid of a cue.

Notice that what has to be demonstrated so as to unite the case of ordinary lexical item acquisition and that of the so-called parameter setting to form a single phenomenon of lexical acquisition may well be that each case involves both an aspect of the relevant instance that has to be reached/identified/established through bootstrapping because of its status as an FLN entity (which should arguably be abstract and hence, inaccessible to the learner as such), and its other aspect that is usually couched in a vocabulary arguably accessible to her and hence, able to serve as a cue in the sense above (e.g., vocabularies in terms of which interfaces such as PF, LF, etc. are defined). Since we have seen above some cases of lexical item acquisition (in a somewhat different context, though), I would like to show a well-studied example of parameter setting (i.e., the head-complement parameter) through phonological bootstrapping. The following prosodic bootstrapping is

actually implemented through what is called the Rhythmic Activation Principle (Guasti, Nespor, Christophe & van Ooyen 2001: 237; Suzuki 2002):

(17) a. When you hear sequences of (ws)* within an intonational phrase, set the head-complement parameter with the value head-complement.

   b. When you hear sequences of (sw)* within an intonational phrase, set the head-complement parameter with the value complement-head.

Arguably, the structural description of the prosodic properties in the intonational phrase in (17a,b) are couched in a phonological vocabulary accessible to the learner and hence, serves as a cue for the purposes of the setting of the head-complement parameter, whereas the head-complement word order itself should be an FLN property inaccessible to her as such. And I would claim that the instances of cue-FLN entity association in (17a,b) are UG-provided (i.e., innately given; see Dresher & Kaye 1990, Dresher 1999). The case in (17) of the so-called parameter setting may be reformulated as an instance of lexical acquisition in that under the assumption of universal VO order (Kayne 1994) the head v^* may have an extra EPP feature (i.e., a lexical property of v^*) so as to ensure some outer Spec v^* into which the object of the verb can move in the case of (17b). The learner's task in this case should be to establish the necessity of v^* having an extra EPP feature (part of the acquisition of the lexical item v^* in the target language) with the aid of the phonological cue shown in (17b). As for (17a), the learner should eventually conclude that v^* does not have an extra EPP feature (another

lexical property of v*). (If the acquisitional scenario with respect to (17) is on the right track, Kayne's 1994 universal base order hypothesis may obtain some interesting support for it.)

5. Some Related Considerations

5.1 Two Different Interpretations of the SMT

While there may in principle be more interpretations of the SMT, I here specifically limit the discussion to the following two interpretations: (i) an evolutionary interpretation (see above); (ii) a constructive interpretation. A constructive interpretation of the SMT would presumably have it that the thesis functions largely in the fashion of a "(lexical) redundancy rule" in the (past) literature, enabling the learner to predict the presence of a different feature on the basis of that of a certain feature in some specific domain (with only the latter feature as a theoretical primitive). Recall also the concept of "canonical structural realization" (CSR; see Grimshaw 1981, Chomsky 1986a), which makes it possible to derive categorial selection from semantic selection that satisfies the condition of epistemological priority, only the latter sort of selection again being a primitive in terms of grammatical theory. That is, in the cases of a lexical redundancy rule and the CSR, the pertinent procedures involved may be that some primitive property in a certain domain is somehow mapped onto some (arguably) derived property (i.e., a theorem in a sense) in some other domain. And the situation concerning the relations between primitives and derived properties should be one where both of them are grammar internal, which fact must entail the possibility of defining both of them in terms of the

vocabulary provided by UG that is primarily responsible for the description of primitives. But the SMT is supposed to deal with the relations between FLN and other systems (i.e., interfaces) that are internal to the human system but external to it (Chomsky 2002). That is, it must not be the case that both FLN and interfaces can be described in terms of a common (UG) vocabulary, which situation should point to the impossibility of deriving FLN properties from interface ones in the manner of redundancy rules and the CSR. Then a constructive interpretation of the SMT should somehow force an "after-birth" construction of FLN properties on the basis of interface ones (exactly) in the fashion of the behaviorist psychological/connectionist account of language acquisition. It would have to construct the whole set of FLN properties in terms of a (theoretical) vocabulary which it does not possess now and out of interface properties that belong to a different domain which it may be totally impossible for FLN to find a way to establish any connection with in the absence of any ingredients contributing to that end due to the (arguably) after-birth nature of the whole framework adopted. This situation with the constructive interpretation of the SMT naturally reminds us of insurmountable problems and difficulties that worried behaviorists when they were faced with the task of explaining the feat of first language acquisition and that are still pestering connectionists in their attempt to account for it solely on the basis of after-birth ingredients (see Gualmini 2005 and Minai, Meroni, & Crain 2004 for some attempts to that effect on the part of connectionists), leaving us to turn to its evolutionary interpretation.

In connection with the present question, Chomsky's (2002) conjecture concerning the advent of FLN may be in order. Chomsky (2002:

108) observes that " ... the system is essentially inserted into already existing external systems: external to the language faculty, internal to the mind. ... The language faculty has to interact with those systems, otherwise it's not usable at all. ... And in fact the only condition that emerges clearly is that, given that the language is essentially an information system, the information it stores must be accessible to those systems, that's the only condition." While there may not be anything theoretically interesting or significant brought forth in talking of this sort which is nothing but sheer speculation (but see Chomsky 2005b: 5 for some justification in support of such speculation in thinking about the core problems of study of language, as long as such a story is "about the simplest one imaginable, consistent with what little is known, and presupposed in some form (often tacitly) in all speculations about the matter"), let me redescribe the advent of FLN by adding some specific details to Chomsky's (2002) original conjecture and reinterpreting part of it on the basis of some recent developments in the biolinguistic literature. Now, the evolutionary situation that starts our discussion seems to be one where FLN somehow entered the human system at the time of evolution when the sensory-motor (SM) and conceptual-intentional (C-I) interfaces had reached a level ripe enough for their specific function. A prima facie, rather straightforward interpretation of Chomsky's (2002: 108) original observation would invite you to assume that what was going to be FLN and interface candidates resided in different places, with the latter arguably in the human system and the former outside. On the other hand, my scenario/ redescription/reinterpretation would somehow conjecture either that some form of FLN precursor (which had somehow already been in the organism for some time) had obtained the property of "recursiveness"

(the sole defining property of FLN) in some evolutionary fashion or other, or that a FLN precursor *with its sole property* had somehow emerged in the human system, the emergence of FLN and that of its property having happened exactly at the same time (or rather, FLN and its property having empirically been one and the same thing). My scenario (which heavily relies on Chomsky 2005b: 4-5 for the treatment of some important evolutionary milestones) then goes on to roughly have it that an FLN candidate (which must have already obtained its sole defining property of "recursiveness," or whose empirical content had totally consisted of this property) underwent a slight mutation (which somehow occurred in the human system, but presumably not in other animals) rewiring the brain about 60,000 years ago, thus yielding (unbounded) Merge (i.e., the sole FLN operation). As for the evolution of FLN into a form approximating the SMT (Chomsky 2005b: 5), I simply observe that now that FLN and interface precursors were in the same human organism at this stage of evolution, it would not be too surprising for something like the SMT to come to establish association or connection of some sort (actually, of a variety of sorts) between FLN and the SM and C-I (and, perhaps, other) interfaces in some evolutionary way (which presumably should have been sudden in terms of evolutionary time).

I here have given my reinterpretation/redescription of Chomsky's (2002: 108) rough observation concerning the possible advent of FLN and the emergence of the SMT (i.e., the notion of "usability" of FLN on the part of interfaces), largely simply by adding hopefully plausible details to Chomsky's (2002: 108) original conjecture. And as for the question of which interpretation of the SMT to take, it should be rather clear that we are somehow forced to adopt its evolutionary inter-

pretation, given Chomsky's (2002: 108) original observation (see also Chomsky 2005b: 5) and my subsequent attempt to reinterpret it in terms of more recent biolinguistic developments.

5.2 *Requirement of Efficient Computation and the Status of So-Called "Deviant" Expressions*

The problem of the third requirement of efficient computation imposed on a successful theory of learnability as it is discussed here specifically points to consequences of Frampton and Gutmann's (2002) crash-proof framework, which seeks to construct a derivational system that only generates grammatical outputs (see also the discussion in sections 1 and 2). Largely abstracting away from a number of important proposals for the problem of efficient computation such as "no-tampering condition" (NTC) of Chomsky (2005b: 5), I restrict the discussion here to the specific goal above set by Frampton and Gutmann (2002). But since specific proposals along the lines suggested here are largely yet to come (but see Frampton & Gutmann 2001 for some specific proposals), I simply note here that there are no problems with all the Japanese *sika-nai* and English *wanna*-contraction examples discussed in the present paper with respect to the problem of the requirement of efficient computation.

Insofar as the crash-proof framework seeks to create a computational system that only generates grammatical derivations, some remarks on the notion of "deviance" presented in a variety of ways in Chomsky (2005b) must be in order.

Here I only take up the following quotation from Chomsky (2005b):

"Merge can apply freely, yielding expressions interpreted at the inter-
face in many different kinds of ways. They are sometimes called 'devi-
ant,' but that is only an informal notion. Expressions that are
unintelligible at the SM interface may satisfy the most stringent C-I
conditions, and conversely. And expressions that are 'deviant' are not
only often quite normal but even the best way to express some
thought; metaphors, to take a standard example, or such evocative ex-
pressions as Veblen's 'perform leisure.' That includes even expressions
that crash, often used as literary devices and in informal discourse,
with a precise and felicitous interpretation at the interfaces. The only
empirical requirement is that SM and C-I assign the interpretations
that the expression actually has, including many varieties of 'deviance'
"(p. 10). While there must be a number of ways of interpreting and ex-
plaining the many different cases of "deviance," presumably involving
factors pertaining to performance as well, cited in the above quotation,
I here only focus on one point that mentions "expressions that crash,
often used as literary devices and in informal discourse, with a precise
and felicitous interpretation at the interfaces." It seems to me that
Chomsky's (2005b: 10) discussion above is too crude a characterization
of the precise mechanism for the interpretation such things as literary
expressions, some finer analytical distinction(s) having to be made be-
tween ordinary and literary expressions. I propose that the actual dif-
ferences between the two cases should be located in the specific way
that the module responsible for each kind of expressions may connect
to FLN (directly or indirectly, for example) in the course of sentential
derivation. Specifically focusing on the problem of semantic interpre-
tation of these expressions, I assume that a direct channel between
FLN and the usual LF module is created for semantic interpretation at

the completion of a strong phase in the case of normal expressions, the latter being interpreted by the latter module, but that only an indirect channel between FLN and the relevant module (via the normal LF module) could be created for interpretation of literary, poetic, metaphorical (,etc.) language, the relevant module responsible for interpretation of these kinds of expressions (called the LPM module, which is independent of the usual LF module) being only able to inspect an expression that is handed over to it after the usual LF module has finished its task of interpreting it (as deviant) *and has detected some sign or other (in whatever form to be made precise) of the requirement of inspecting it on the part of the LPM module* (otherwise, the relevant interpretation would be over at the time the LF module interpreted the expression as deviant, the latter expression presumably being excluded at this point of the derivation from further derivational operations). Having detected the sign from the LPM module to the relevant effect, the LF module hands the expression over to the LPM one (or, the latter module may reach the former through the channel to take it home), with the result of the LPM-treated expression being sent back to FLN via the LF module (see Suzuki 2005 and relevant portions of the present paper for further specific and minute details of the framework and mechanisms involved; possibly other instances of the notion of "deviance" may be among the topics in future research).

5.3 *Kiguchi and Thornton (2004)*[11]

Effects of principle B of the binding theory are frequently observed in the literature to be weakened in the case where the antecedent of the

pronoun is a referential NP. Kiguchi and Thornton (2004) show that in ACD constructions principle B effects are fully operative both in the case where the antecedent is a referential NP and in the case where it is a quantified NP. I would interpret the difference as derivable from the presence vs. absence of some sort of *influence* of the interfacing PF on the interfacing LF, the relevant influence being present in the referential-NP-antecedent case and absent in the quantified-NP-antecedent case. And my position here is to follow Kiguchi and Thornton (2004) in assuming the validity of Chomsky's (1981) original theory of binding, according to which both coreferential and bound pronouns are subject to principle B. Other theories such as Reinhart (1983) and Grodzinsky and Reinhart (1993) claim that only bound-variable pronouns are subject to principle B and that local coreference relations lie outside the domain of principle B, being handled instead in terms of a pragmatic principle called "Rule I" (Grodzinsky & Reinhart 1993).

I would like to go on to elaborate on the precise nature of this "influence," given the framework of Suzuki (2005), where bi-directional "on-line" passage of some sort (after computer technology, in a sense) creating channels between FLN and interfacing modules *and* between interfacing modules themselves (via FLN) can be available at the completion of a strong phase (with the operation of "channel creation" subject to economy). I would like to suggest that influence of the relevant sort here should be phonological stress assignment to the relevant pronoun (abstracting away from some other possible obscure sorts of influence). Then this would involve the assumption that a referential pronoun, but not a bound pronoun, can receive stress, a fairly standard semantic/pragmatic assumption. I would like to give a rough picture involving FLN and interfacing modules where there are channels of

some sort created at the completion of each strong phase (subject to economy) connecting FLN and the relevant interfacing components through which FLN-generated entities are TRANSFERred to the interfaces and they may be sent back to FLN after due treatment. I would, moreover, like to suggest that any interfacing module can reach any other such interfacing module(s) *via FLN at the completion of each strong phase* (with the creation of possibly bi-directional passage/channel(s) subject to economy; see the discussion above). It should only be thanks to this kind of organization of the grammar (due to Suzuki 2005) that the property of phonological stress assignment (at PF) can influence the interpretation of principle B effects (at LF) in such a short while as the interval pertaining to the completion of a strong phase.

Some further detailed analysis may be in order of the mechanism and precise workings on the part of necessary grammatical ingredients involved in the creation of "influence" of the sort under discussion. Let us observe closely the details seen in the phenomenon concerning the weakening of principle B in terms of the following pair of examples taken from Kiguchi and Thornton (2004: 240):

(19) a. Every bear is washing her.

   b. Mama Bear is washing her.

I adopt Chomsky's (1995: 211) interpretive version of the binding theory, according to which binding principles A, B, and C apply at LF and the formulation of principle B is as follows:

(20) *Principle B of the binding theory*

   If α is a pronominal, interpret it as disjoint from every c-com-

manding phrase in D (D a relevant local domain).

Let us go on to see the strong phase-wise derivation of (19a,b) step by step. We have for (19a,b) the structures "$[_{v*P}$ every bear/Mama Bear washing $[_{VP}$ washing her$]]$" respectively at the completion of the strong v*P phase, VP being subject to TRANSFER in the sense of Chomsky (2004) (and marked for inaccessibility and hence potentially able to be made visible by the Phase-guiding principle (PGP)).[9] Assuming with Chomsky (2005b: 9) that "... that for T, ϕ-features and Tense appear to be derivative from C. In the lexicon, T lacks these features. T manifests them if and only if it is selected by C (default agreement aside); if not, it is a raising (or ECM) infinitival, lacking ϕ-features and tense," I claim that the examples in (19a,b) contain a (matrix) C-structure and take the structures for (19a,b) at the completion of the strong (matrix) CP phase to be "$[_{CP}$ C $[_{TP}$ every bear/Mama Bear is $[_{v*P}$ every bear/ Mama Bear washing $[_{VP}$ ϕ $]]]]$" respectively, TP being TRANSFERred to interfacing modules (abstracting away from identification of the original position of the copula, from possible QR of the quantified NP in (19a), and also from the phonological WCP rule; see Suzuki 2005 for the latter).[10] For the purposes of pronominal interpretation in terms of principle B of the binding theory in (20), I assume the relevant local domain D to be the v*P portion of the TRANSFERred TP with the VP part made visible by the PGP *for interpretation purposes* (see Suzuki's 2005: 59 "Condition on the PGP operation" and Kitagawa 1991: 217 for an argument concerning D). Principle B equally interprets the pronominal *her* in (19a,b) as disjoint from *every bear/Mama Bear* respectively.

It has long been known in the literature that heavy stress on the

pronoun (and possibly pointing, as well) may allow it to refer back to the local name antecedent.

(21) a. Mama Bear is washing HER.

(with the capitalized portion stressed)

  b. Mama Bear is washing *her.*

(with the italicized portion accompanied by pointing)

Before getting on to the exposition of the situation where principle B effects are somewhat contaminated presumably due to some sort of "influence" touched on above and to some speculation on the possible mechanism involved in the pronominal interpretation in (21a,b), let us recapitulate the standard dichotomy between referential and quantified NPs. That is, as is well-known, when the antecedent is a quantified NP as in (19a), the relevant pronoun would get a bound-variable interpretation, while the referential NP antecedent would corefer with the relevant pronominal or it would variable-bind the pronoun, as in (19b) (see Reinhart 1983, Grodzinsky & Reinhart 1993).

Let us then consider what may be responsible for the (near) *coreferential* interpretation of the pronominal in (21a,b). For the purposes of discussion, suppose that we have the following descriptive generalizations concerning the effects on the LF interpretation on the part of the PF and "sign" interfaces under the assumption that there is an independent sign module pertaining to "signed language" in addition to the PF component pertaining to spoken language, given modality-independent FLN:

(22) a. Stress assignment may cancel effects of principle B of the bind-

ing theory.

(relevant to the PF module)

b. Pointing may cancel effects of principle B of the binding theory.

(relevant to the sign module)

Assuming the validity of the generalizations in (22a,b) (which it should be part of the task of our future research to derive from deeper principles), the coreferential interpretation of the pronominal in (21a,b) follows in that the pronominal in each case is free to take any c-commanding NP as its antecedent in the absence of any (local) domain in which it cannot take an antecedent thanks to (22a,b) (see the LF formulation in (20) of principle B of the binding theory). Notice here also that the typical situation in (22a,b) where a property pertaining to one independent module (e.g., stress assignment, pointing) can affect a property of another independent module (e.g., effects of principle B of the binding theory) can only be possible in such a framework as Suzuki's (2005) in which there is an "on-line" (computational) system that creates bi-directional channels connecting any independent external modules via FLN (subject to economy) at the completion of each strong phase. (A more or less principled account of the situations in (22a,b) would be hard to obtain without complications in a representational framework where there would be only one point of contact between FLN and other external interfacing modules, with no points of contact at all between or among these interfacing modules whether via FLN or not, to the best of my knowledge. The latter situation pertaining to lack of interconnectivity between interfacing modules (via FLN) which can also be seen in other derivational frameworks with multiple

spell-out may constitute a strong obstacle to these derivational theories obtaining deeper explanatory principles and also to their arriving at the true nature of the ontology of language.)

Let us now turn to the possible exposition of the way and reason that effects of principle B of the binding theory is weakened in children, as has constantly been noted in the literature, in the case where the antecedent of the pronominal is a referential NP (19b) (which has led some researchers to reformulate Chomsky's 1981 original principle B of the binding theory in such a way that it is possible to treat referential and bound pronouns in a different manner; see Reinhart 1983, Grodzinsky & Reinhart 1993). Note that the core result of the discussion above concerning (19a,b) and (20) is that principle B in (20) equally interprets the pronominal her in (19a,b) as disjoint from *every bear/-Mama Bear* respectively. But the constant problem has been the puzzling situation where children accept the prohibited interpretation of (19b), on which Mama Bear washes herself, at a rate of roughly 50%, while adults generally reject it on this interpretation apart from the cases above in (21a,b), where stress assignment and pointing intervene and affect their interpretation respectively (see the discussion above). Note that we follow Suzuki (2005) (based on Epstein et al. 1998 and Lopez 2003) in assuming that interfaces/modules/components must be "invasive" rather than interpretive, specifically in the sense that some of their properties enter narrow syntax and are carried along throughout the syntactic derivation (see Suzuki 2005: 11-15 for further discussion, arguments, and examples and also for arguments for the usability of FLN on the part of these interfaces in terms of the SMT). Turning to child language, it has been pointed out in the literature that the ability to interpret word stress does not develop in children until

age 5 or 6 and thus that before the ability to interpret word stress develops, children allow the coreference reading even in "ordinary" contexts and in the absence of pronominal stress (McDaniel & Maxfield 1992, Thornton & Wexler 1999; see Kiguchi & Thornton 2004: 241-242).

I would like to make an attempt to give a rough sketch of possible workings of the mechanism(s) involved in describing differences between the child and adult interpretation of such alleged principle B violations (on the part of children) as (19b). We begin with the legitimate adult interpretation on which examples such as (19b) is rejected as ungrammatical, apart from cases involving stress assignment and pointing which are usually judged to be much more acceptable. Recall some more or less minute details of Suzuki's (2005) framework: i.e., it contains in it an "on-line" computational system at the completion of each strong phase in order to yield possible connections (subject to economy) between FLN and interfacing components and also between such components themselves via FLN and where the FLN function of mapping to the interfaces (TRANSFER in the sense of Chomsky 2004) is somehow strengthened to such an extent that it is possible to create bidirectional channels through which a portion of the narrow-syntactic derivation is handed over to interfaces and then such an interface-treated portion is sent back to narrow syntax and, moreover, an interfacing modules can send its own treated elements to another such module via FLN/narrow syntax, all operations being subject to economy (the set of assumptions here called the SMH; see above). Now, as for the legitimate adult interpretation on which (19b) is judged to be ungrammatical in the absence of any phonological stress assignment or pointing as a result of the application of principle B of the binding theory (20) to it, the local domain relevant to binding here should be

v*P, which constitutes part of the portion TRANSFERred to interfacing modules (TP) at the completion of the strong CP phase (see above for some details of a variety of workings involving the application of the PGP in conformity with the condition on the PGP operation). Let us see the relevant parts of the narrow-syntactic derivation of (19b) plus concomitant TRANSFERring operations:

(23) a. [$_{CP}$ C [$_{TP}$ Mama Bear is [$_{v*P}$ Mama Bear washing [$_{VP}$ ϕ]]]]

  b. [$_{TP}$ Mama Bear is [$_{v*P}$ Mama Bear washing [$_{VP}$ washing her]]]

The narrow-syntactic structure in (23a) is obtained at the completion of the strong CP phase, and (23b) is the portion that has been sent to the interfacing LF-module, with the VP part reactivated by the PGP at LF. I assume here that the local domain relevant to principle B of the binding theory is v*P, in which the pronoun *her* is interpreted as disjoint from the referential NP *Mama Bear*. Notice here in particular that the PF and sign modules do not try to reach LF (via FLN) in the absence of any factors such as stress assignment or pointing that could influence the interpretation obtained through the application of principle B (20), there being no PF-LF or sign component-LF channel creation detected in this case. This should be the adult situation, where principle B effects are observed in a readily transparent fashion

Let us turn to the child case where children have been reported in the acquisition literature to accept the coreferential interpretation of (19b) roughly 50% of the time. As noted above, children have been observed to be late in developing the ability to interpret word stress (McDaniel & Maxfield 1992, Thornton & Wexler 1999; Kiguchi & Thornton 2004: 241-242). And according to Thornton and Wexler (1999:

66-77), children allow the coreferential reading of the local pronominal even in the absence of pronominal stress before the ability to interpret word stress develops (putting aside the problem of "pointing" as it pertains to signed language and restricting the discussion to stress assignment in spoken language). Roughly following Thornton and Wexler's (1999) description above of the child situation at this stage of development with principle B of the binding theory as it pertains to referential NP antecedents, I first assume the following default interpretation of the function of the phonology from the viewpoint of learnability:

(24) *Default interpretation of the function of the phonology*
  All properties of the phonology affect semantic interpretation.

It looks as if children retrace throughout the various stages of their individual language development the wholesale development of language evolution involving even stages before the advent of FLN in the human organism. Long before the emergence of such properties as discrete infinity and the Saussurian arbitrariness, language (precursors) must have had properties that have somehow contributed to inviting considerations of the sort that have motivated some theories of language such as onomatopoeic studies and the like which generally take the relationship between sounds and meanings to be tight and close to the extent that it should be the usual practice in these theories to search for necessary and inevitable connections between the two. I assume that at earlier stages of the child language development all phonological properties *can* affect semantic interpretation even in the absence of the acquisition of stress assignment (see (24)). This scenario

may lead us to resort to some sort of maturational theory of language development, at least in this domain pertaining to the possibility of the phonology having influence on semantic interpretation, which circumstances may not be surprising at all, given the fundamental (but a bit complicated) situation with the Saussurian *signifiant-signifié* connection (Saussure 1968/1983), where the *actual* form of the *signifiant* may well exert influence on the *signifié* in spite of the fact that it should be the latter that has priority over the former for the simple reason that the former is present just in order to express the latter (in a more or less arbitrary manner, though). Why and how this sort of (perhaps, long-standing, or even inherent) complication with the *signifiant-signifié* relationship has arisen and come to exist in the human language situation may itself be a quite interesting problem that should also bear on the philosophy of language and the psychology and pathology of language. Notice in this connection that sounds, signs, etc. (i.e., elements that are presumed to have the property of *signifiant*) are themselves physical entities which should have their own characteristics that are in principle independent of their *signifié* counterparts, which should have motivated at least part of the reason that led to the Saussurian arbitrariness (departing somewhat from Saussure 1968/ 1983 in the interpretation of the ontological status of the *signifiant-signifié* relationship, i.e., in not taking it to be an instance of "two sides of the same coin," and thus allowing the two concepts a more independent, individual ontological status). They may well be vehicles for conveying meanings, which is thought to constitute the rule in terms of language function, but they can sometimes turn out to be more than mere vehicles presumably because of their natural/physical properties, sounds being a typical case in point. In any case, it should be clear that

this account of the relevant developmental stage(s) of child language may explain in our terms the availability in children of a PF-LF channel (via FLN, at the completion of the relevant strong phase) even in the absence of pronominal stress and the concomitant influence (in whatever form and fashion to hopefully be discovered in future research) through this channel of PF on semantic interpretation at LF (see (19b)).

We now see that we are in a position to explicate in our terms the following findings reported in Kiguchi and Thornton (2004: 266-267): "We have proposed that these two factors (i.e., the pronoun in question, which is in an ACD construction, being referential and unable to be stressed — *NS*) eliminate a potential local coreference reading, giving a 'purer' test of principle B. The finding is, indeed, that children are more accurate at rejecting principle B violations in ACD sentences (with a referential NP antecedent) than has been shown in previous experiments; in our ACD experiment, children reject principle B violations in the recovered VP of the ACD structure 85% of the time, as compared with the reported 50% acceptance rate in matrix principle B sentences." Putting aside the case of bound-variable interpretation for the pronoun (with a quantified NP antecedent; see (19a)), which Thornton and Wexler (1999: 59-66) assume to be readily available to children, I assume that in ACD principle B cases the "recovered VP of the ACD structure," for which a principle B violation occurs, (Kiguchi & Thornton 2004: 266, above) does not have its LF-module counterpart. As you may expect, the latter situation should lead to the conclusion that even given the maturational principle in (24), the child phonology cannot affect semantic interpretation for the portion of the LF-recovered VP of the ACD structure for which LF-principle B of the binding theory applies, precisely because the putative PF-module portion corresponding to the

LF-recovered VP of the ACD structure does not exist. Overall, I hoped to have shown in terms of the SMH (see above, Suzuki 2005) a possible mechanism involved in the explanation of the Kiguchi and Thornton (2004) finding that "children are more accurate at rejecting principle B violations in ACD sentences," which I would hope will give strong support to Suzuki's (2005) framework involving the SMH as one of its most important theoretical ingredients.

5.4 Some Remarks on the Ontological Status of Grammars

As for the problem of language acquisition/learnability, I largely follow the general framework of Suzuki (2002), where the bootstrapping approach to parameter setting/language acquisition (with the concept of bootstrapping in the original sense of Pinker 1984, Bloom 1999) is favored both over the E-language-based Triggering Learning Algorithm (TLA) approach of Gibson and Wexler (1994), whose learning procedures have been shown to belong to the component of as yet obscure general learning strategies at best and where you constantly detect recalcitrant problems of the local maxima sort, and over the I-language-based Structural Triggers Learner (STL) approach of Fodor (1998), which is constantly pestered with the Access Problem (which has prompted bootstrapping approaches to be proposed; see also the discussion in Suzuki 2002).

According to the standard assumption, a grammar should roughly be composed of the invariant UG principles, which are presumed to be common across all languages, and the ten or more (binary) parameters (with the value set {1,0}, for computational purposes), which are de-

signed to define linguistic variation and must already have been set in the direction of the grammar in question, plus the lexicon of the target language. In contrast to this standard picture of a grammar, I would assume it to be something like a set of heterogeneous factors and elements residing in different components and places. And the user of the grammar (i.e., the parser/processor, the language "producer") would have to have access to these different corners to obtain necessary ingredients/information to implement language performance. The implicit assumption here is that a grammar is not an already completed whole residing in a single place, but a *living being* in the sense that it gets composed over some actual time interval, presenting itself only in performance (its abstract picture being, of course, possible, though). This should be an instance of a strictly *ontological* view of a grammar.

I follow the standard assumption in that FLN should be the locus of UG principles and parameters, adding to it the proposal that a number of interfacing, external (to FLN) components/modules can connect to FLN and to other such modules via FLN at the completion of a strong phase, the connecting operation/channel-creation being subject to economy (SMH; see the discussion above, Suzuki 2005). I assume that both options of binary parameters continue to be available even after "parameter-setting," which is usually implemented during the critical period and hence, necessarily involves neuro-physiological re-wiring, and that the lexicon also counts among interfacing modules, which would perhaps have the desirable consequence of getting rid of the controversial notion of numeration along with its related concepts of lexical array and subarray (since the lexicon can be accessed at the completion of each strong phase).

According to the scenario so far, since both options of a binary pa-

rameter are always available, the child (and the adult) can always have access to them, with the traditional notion of parameter-setting limited to the current grammar. (Recall Fodor's 1998 notion of a *supergrammar*, such that it consists of the learner's current grammar plus all of the UG-defined trigger structures; borrowing this term with appropriate adjustments made so as for it to fit in with the present framework, I henceforth call a "supergrammar (SG)" a system that specifically continues to retain all remaining parameter options in addition to the options relevant to the current grammar.) This may provide us with some means of accounting for the everyday situation pertaining to language/grammar described in Lightfoot (2006: i) as follows: "New languages are constantly emerging, as existing languages diverge into different forms." The emerging picture of grammars seems to be that they may not be nearly as stable as is generally believed. Although a grammar may exist in abstract and potential terms (and in real terms in a sense; recall the usual generative grammar assumption of reality of this kind), a *sample* grammar corresponding to the abstract grammar only emerges as a result of the parser/processor or the language producer accessing the many different places to obtain (economically) necessary pieces of information that may eventually constitute its foundational ingredients. This should hold true of the child acquiring language even if accessing is implemented through bootstrapping (see Suzuki 2002). (Notice that the relationship between the abstract/real grammar and the sample grammar thus obtained should not be that between the concepts of competence and performance, specifically the latter notion applying to external languages.)

Children who used overregularized forms such as *goed, singed*, etc. in stead of the adult forms *went, sang*, etc. are reported to have used

these unconventional forms, remarking to their father that he should use the conventional forms when they heard him trying to mimic them by using the unconventional forms (Guasti 2002). Capitalizing on the notion of supergrammar (SG) in the sense of Fodor (1998), I would interpret this situation where instances of overregularization are observed with the concomitant remark on the part of the learner as follows: "Overregularization itself may result from the UG-defined default setting of the (morphological) rule(s) responsible for deriving inflectional paradigms, presumably because of the as yet short, shallow, and insufficient association with the adult version of the target language on the part of the learner (the reason for which situation must be sought in principled terms). Children's remark on their father's language should indicate that they have in themselves SG, which may explain the availability of both conventional forms (due to language fact) and unconventional ones (due to the UG-defined default setting). And it should simply be a matter of time before children switch over from the current unconventional stage to the adult conventional one without any learnability problems, given the system with SG incorporated in it."

Some more remarks on the system with SG incorporated in it may be in order. First, the overall picture surrounding FLN may be described like the following: "FLN continues to be available to a human individual in her organism/system throughout her life. But there should be a number of (perhaps, sharp) differences in the efficiency/sustainability/etc. of the (partly) acquired system (i.e., the grammar and the lexicon), depending on the biological stage of development when it is acquired. The relevant dichotomy is, of course, between the biologically critical period and the post-critical period, the standard as-

sumption being that biological acquisition is only possible in the former period, while you would have to resort to GLS of some sort in the latter. Specifically, what continues to be present in the human system after the critical period is over should be SG, that is, the version of UG parametrized in the direction of the target language (crucially) with all the remaining UG-defined parameter options preserved as they are at birth (apart from the lexicon; but see Borer 1984, Fukui 1986, Atkinson 1992 for the FPH, which restricts the application of parameters to the functional domain of the lexicon, and also the lexical condition on language acquisition in (6))." Speaking in terms of the head parameter with the VO vs. OV options, the native speaker of Japanese who has biologically set the parameter is assumed to continue to have the two values, one for Japanese (i.e., OV) and the other VO value. Although biological setting and GLS setting (as might be the case with second language acquisition) may be fundamentally different with subsequences due to the former necessarily subconscious and ones due to the latter largely conscious, I assume the differences between them to not be nearly as considerable as one might conjecture, given the strictly ontological view of grammars. The present version of the strictly ontological view of grammars would have it that "the only locus of grammar realization must be in language performance (such as comprehension/interpretation, production, parsing/processing) in that it should only be through an instance of performance that a set of heterogeneous kinds of information/data scattered around in a variety of independent modules can be accessed, as a result of which a grammar may emerge." Physically speaking, moreover, the grammar that has emerged in this fashion still may not be a whole complex whose ingredients have been assembled in a single space, but simply a whole in

a *metaphorical* sense with its foundational ingredients having been accessed and capitalized on in their original places only for current purposes. That is, grammars as wholes (in the metaphorical sense) appear only in instances of performance with *raw materials* for grammar formation residing in their individual module throughout the human individual's life more or less in their original form, which may lead us to conclude that one of the most viable conceptions of I-language/(competence) grammar as it is usually distinguished from E-language/performance should be discovered in the present interpretation of a *mental/abstract* grammar. These mental/abstract grammars appear and disappear along with a specific time-bound instance of performance, with only the raw materials for grammar formation in the sense above continuing to be available throughout the human life. Presumably, then, it should be the raw materials for grammar formation that are physically real, whereas (different) grammars may only be epiphenomena arising concomitantly with an instance of performance due to (fixing of) the UG-provided parameter options. Overall, the present ontological conception of grammars may point to the plausibility of the assumption implicit in Lightfoot (2006) that it must actually be the case that "grammars are much more unstable and subject to change."

I would assume that accessing of raw materials for grammar formation in the sense above must be implemented in exactly the same fashion that TRANSFER in the sense of Chomsky (2004) is carried out (at the completion of each strong phase, through on-line (bi-directional) computational channels connecting FLN and interfacing modules or connecting such a module via FLN to another one, the operation being subject to economy, etc.), since in the present framework the concept of

a grammar is equated with that of grammar formation (at a specific actual time) and, moreover, the concept of grammar formation with that of constructing a sentential derivation. As for the choice of parameter values in each instance of linguistic performance, I simply assume that the child almost always opts for the (parameter) values at which she has set the relevant parameters during the critical period and that she would resort to the default values in the absence of relevant experience. And as for the constant concern over the immense size of parameter space with only dozens of binary parameters in place particularly in frameworks dealing with parameters from the E-language perspective (see Roberts 2001, Lightfoot 2006), I claim that problems of the sort do not arise at all simply because in the present framework parameter setting relevant to biological acquisition does not have as its objective the identification of any target language, that is, of any set of parameter values, but the identification of a single parameter value (at a time). The current (and the only) concern on the part of the learner at some real time must simply be over how to set the parameter in question, the problem of successfully arriving at the eventual target language and the eventual set of parameter values that would constitute part of the basis of the target language never being any problem for her at any time, which picture points to an instance of a strictly local theory of parameter setting/language acquisition, another desirable consequence (see Lightfoot 1999: 149 for some discussion to the similar effect).

Mulders (2005) is an interesting attempt to implement parsing in terms of what is called a "transparent parser," which is as close as possible to grammatical theory, the specific empirical domain covered by her (2005) paper consisting of so-called garden path sentences. Mulders

(2005) goes on to differentiate between the garden path case where reanalysis is rather difficult and the normal case that still requires reanalysis, which is not hard at all, in terms of a constraint based on Chomsky's (2000, 2001) phase impenetrability condition (PIC). I assume the parser to be an independent module (with a strong flavor of performance; notice the usual top-down approach to sentence analysis on the part of the parser) that can directly connect to FLN. In terms of the local vs. global distinction in the sense of Fodor (2000: 5) among various mental processes, I assume the parser to be a local process, hence being computational, largely modular, and innately specified, which characterization may fit in rather well with the standard assumption concerning the human parser. My other assumption here is that only modules responsible for a local mental process can directly connect to FLN, while modules responsible for a global mental process cannot.

Concomitantly with the presence of the parser module for the performance purpose of sentence processing, I would like here to propose another module for performance purposes in the domain of sentence production, which I tentatively call the "producer module" for lack of a better term. I here again assume the human producer to be an independent module that can directly connect to FLN, since it is also a local mental process, being computational, modular, and innately specified. For the sake of concreteness and exposition, I tentatively adopt Terada's (1999, 2002) "top-down" approach to structure-building (which is based on Phillips (1996, 1998) and has originally been presented as a usual instance of syntactic analysis with the usual set of grammatical rules and principles) and reformulate it as a model of the human producer.

Omitting the specific, technical details of Terada's (1999, 2002) framework, I would like to consider some plausible consequences of adopting these two performance modules with their inherent properties. Under the assumption above that only the raw materials for grammar formation (e.g.,innately specified parameters with their two options constantly in place) are physically real (residing in the brain, presumably with some factors contributing to indication of the results of critical period parameter setting and hence, of the lexicon of the target language, which may be the sole product of language acquisition/ parameter setting), so-called grammars being only epiphenomena arising as a result of various modules accessing those raw materials (see above for more discussion) and appearing only in instances of performance, two major performance modules responsible for grammar formation that access FLN raw materials should be the parser and the producer. Recall that both sentence processing on the part of the parser and structure-building on the part of the producer are "*top-down*" procedures, where so-called grammars emerge. If only FLN raw materials are real and the parser and the producer are about the only (performance) modules responsible for the formation of grammars as epiphenomena, we might be led to some conclusion that the standard, long-practiced "bottom-up" procedure for structure-building should only be an artifact of linguistic theorizing (which conjecture would, of course, have to be tested and justified on ample empirical and conceptual grounds).

6. Conclusion

I hope to have demonstrated in this paper the (nearly) precise mecha-

nism(s) on which the child accomplishes the fascinating feat of first language acquisition, along with the four concomitant requirements imposed on a successful learnability theory. Largely on the basis of Suzuki's (2005) framework, where various interfacing modules (both competence-wise and performance-wise) can have ample, direct access to FLN in case they are local mental processes in the sense of Fodor (2000), I have somehow shown the distance between competence and performance to not be nearly as considerable as has been assumed so far and, more importantly, have proposed a grammatical system where the only physically real entity is (a set of) FLN raw materials for grammar formation (based on the notion of "supergrammar" (SG) in the sense of Fodor 1998; involving the lexicon) and so-called grammars only appear in instances of performance (largely on the part of the parser and of the producer) in a time-bound fashion. Moreover, since the two performance modules, the parser and the producer, have been shown to operate in a "top-down" manner and grammars (now as epiphenomena) emerge only in instances of performance on the part of these modules, the factual and conceptual basis on which to establish the validity of the standard, long-practiced "bottom-up" procedure of syntactic derivation has been called into question.[12]

Notes

1   Hauser, Chomsky, and Fitch (2002: 1569) observes: "···We submit that a distinction should be made between the faculty of language in the broad sense (FLB) and in the narrow sense (FLN). FLB includes a sensory-motor system, a conceptual-intentional system, and the computational mechanisms for recursion, providing the capacity to generate an infinite range of expressions from a finite set of elements. We hypothesize that FLN only includes recursion and is the only uniquely human component of the faculty

of language. We further argue that FLN may have evolved for reasons other than language ⋯"

2　According to Chomsky 2005b: 14, the (relevant) position of the unpronounced copy of *who* in (12cii)) may be Spec, VP of the matrix clause, the resulting raising of the *wh*-phrase to the matrix Spec, VP arising from the treatment of the relationships between V and v* (a strong phase) along the lines of that of the relationships between T and C (another strong phase).

3　The formulation of the innate cliticization principle in (14b) is an adaptation of the "UG condition on deletion" in Anderson & Lightfoot (2002: 47). Recall the remarkable similarities between deletion and cliticization, the launching site of cliticization being a species of deletion site.

4　Perhaps, one of the strongest arguments in support of the (possibly controversial) assumption that the phonologically and semantically treated portion is sent back to narrow syntax may come from the analysis (Suzuki 2005: 29-31) of Legate's (2003) examples (which have originally been taken from Bresnan 1972 "On sentence stress and syntactic transformations") that involve NSR (nuclear stress rule) effects which must be raised as part of the element containing them, the working assumption here being that movement can only take place in narrow syntax. Note that in our framework the operation of strong phase-wise multiple spell-out (and its sending-back portion) is subject to economy, which may be reminiscent of Uriagereka's (1999) version of multiple spell-out. The term "economy" is used here in the sense of Fox (2000), where it was originally introduced as a grammatical (meta-) principle constraining the application of optional rules, and the concept was later adopted and developed by Chomsky (2001).

5　Contra Chomsky (2005b: 21), where it is plainly stated that "(I) SO (syntactic object — *NS*) cannot be transferred to the SM interface ('spelled out') if it is subsequently going to move⋯. (I) is transparent, unless more complex apparatus is introduced that we would hope to avoid." I would claim that empirical evidence points to other directions, the case of Legate (2003) in note 5 above being one of the strongest pieces of evidence in the direction of the lines of Suzuki (2005).

6　Given Chomsky's (2005b: 9) assumption in the text, we depart from

Chomsky's (2004) "root-clause" TRANSFER (presumably, originally due to J.W. Nissenbaum and adopted by Suzuki 2005) specifically in the treatment of matrix Tensed clauses pertaining to the operation of TRANSFER/spell-out (see Suzuki 2005: 47-48).

7   Unlike Chomsky (2001), who somehow adopts a weaker version of the Phase-impenetrability condition (PIC), I follow Suzuki (2005: 41-42) in assuming the validity of its rigid version. And while Chomsky's (2001: 14) original Phase-guiding principle (PGP) treats only one strong phase in addition to the current one, Suzuki's (2005: 59) "Condition on the PGP Operation," which replaces Chomsky's (2001) original PGP in a sense, allows the PGP to range over at most two more adjacent strong phases in addition to the current one (see the discussion in Suzuki 2005 for arguments for this assumption). Moreover, Suzuki's (2005: 60) principle of the "Timing of Inaccessibility Determination" goes as follows:

(i) *Timing of Inaccessibility Determination*

In the structure "$[_{Ph3} \ldots [_{Ph2} \ldots [_{Ph1} \ldots [_{E} \ldots]]]]$," where Ph is a strong phase and E an element TRANSFERred at the completion of Ph1, E continues to be marked for inaccessibility and hence potentially able to be made visible by the PGP (at the completion of a strong phase) until the completion of the strong phase two stairs up (Ph3), and at the completion of the latter phase it turns inaccessible to any further operations across modules forever.

8   Chomsky (2005b) observes that "... It has always been presupposed without comment that EM (external Merge — *NS*) comes free .... IM (internal Merge — *NS*), in contrast, has been regarded (...) as a problematic operation, an 'imperfection' of language ... unless it can be motivated in some principled way. ... A few years ago, it became clear that this is a misunderstanding. IM (=Move, with the 'copy theory') is as free as EM; it can only be blocked by stipulation. The *absence* of the operation would be an imperfection that has to be explained, not its use in deriving expressions (p.7). ... Suppose that EF (edge-feature — *NS*) permits free Merge to the edge, indefinitely" (p.10) (see Nevins 2005, Miyagawa 2005). Doubting the standard as-

sumption that the surface subject is an island, Chomsky (2005b: 13-14) goes on to discuss the subject-island subcase of the CED effects (Huang 1982), making finer distinctions among "subject-island violation" cases in terms of his PIC and leading us to tentatively formulate the following constraint that can hopefully cover a wide range of movement (both overt and covert) cases:

(i) *Generalized PIC*

The participants in a dependency cannot be separated by a strong phase head (i.e., v*, C).

9   I here abstract away from considerations pertaining to "sideward movement" in the sense of Nunes (2004).

10   Another strongest version of the SMT may be found in Suzuki's (2005: 73) formulation of the SMT:

(i) *Strong Minimalist Thesis ('strongest version')*

Every piece of innate linguistic knowledge reflects some innate knowledge in some other domain.   (my (29))

Suzuki (2005: 73-74) also entertains a possibility of strengthening (i) to a biconditional comprising (i) and the proposition that "every piece of innate non-lingustic knowledge is associated with some innate linguistic knowledge." Notice that the latter proposition may not be nearly as implausible as one might think. But rather, specifically for the case of "local mental processes" in the sense of Fodor (2000: 5), which are generally assumed to be "computational," "modular," and "innately specified," I claim that they can directly connect to FLN (see section 5.4 of the text for discussion), in sharp contrast to "global mental processes" in the sense of Fodor (2000: 5).

11   One strong piece of evidence in support of the factual picture of the FLN-interface *and interface-interface* connection (specifically, of the latter stronger assumption that some passage of the computer technology "on-line" sort is possible via FLN between external modules interfacing with it at the completion of a strong phase) may be obtained from Kiguchi and Thornton's (2004) analysis of principle B of the binding theory in ACD con-

structions (see the discussion in section 5.5 of the text for further details).

12 As the reader may already have noticed, the analysis and exposition of the relevant examples discussed in the text and some principles proposed there are dealt with largely in the standard bottom-up fashion, partly for expository purposes and, perhaps, partly for lack of deep understanding of top-down derivational processes with such computational constraints as the PIC (Chomsky 2000, 2001) in place. Reanalysis of them in terms of the top-down procedure (e.g., Terada 1999, 2002) would require further, ample empirical evidence in support of it. Conceptually, I would claim that the proposed system should be sufficiently tenable that involves the notion of SG (Fodor 1998), which alone is physically real (apart from the lexicon), and that takes individual grammars to only appear in instances of performance (e.g., the parser, the producer) in a real time-bound fashion (see Yang 2002 for a system modeling grammar competition and Lightfoot 2006 for the view that languages/grammars are much more unstable).

What about the standard bottom-up procedure of syntactic derivation then? This situation may remind us of the "psychological reality" problem in the 1970s and early 1980s (see Halle, Bresnan & Miller eds. 1978). A number of people challenged generative syntacticians to show psychological realities corresponding to transformational rules proposed by the latter. To the best of my knowledge, the debate gradually came to an end in an obscure manner, partly because the focus of people's attention shifted to other (more interesting) issues and, presumably, partly due to the recognition (largely on the part of generative grammarians) of the irrelevance of the notion of "psychological reality," which should best be considered to be a matter of performance, in dealing with transformational rules, which obviously are a matter of competence.

Can the same logic hold for the present case? Is it not still possible to claim that even if the parser and the producer are to operate in a top-down manner, the usual syntactic structure-building can still be bottom-up since the latter is a matter of competence? But it seems to me that recent theoretical developments in the generative tradition have somehow been helpful in making much closer to each other the alleged loci of the two linguistic

phenomena (i.e., performance and competence) arising from the traditional dichotomy that has been quite instrumental in clarifying the objective of linguistic inquiry thanks to the postulation of the "idealized" language user (Chomsky 1965). As a most telling example of this, I have suggested in the text (see section 5.4) that the parser (i.e., a performance module), for example, can directly connect to FLN (a bona fide notion of competence). And as long as our objective is to construct a biologically realistic system of language, I would say that the standard, long-practiced bottom-up procedure of syntactic derivation may not have much to support its factual existence. And, of course, perhaps the whole process of reexamination and reanalysis of the tremendous amount of data so far standardly dealt with should require much patience and endeavor, involving much empirical and theoretical effort when confronted with perhaps very recalcitrant minute details of the data/cases in question (see Terada 1999, 2002 for a concrete example of the implementation of the top-down approach to structure-building).

References

ANDERSON, S.R. & D.W. LIGHTFOOT. 2002. *The language organ.* Cambridge: Cambridge University Press.

ANTONY, L.M. & N. HORNSTEIN, eds. 2003. *Chomsky and his critics.* Oxford: Blackwell.

AOUN, J. & D.W. LIGHTFOOT. 1984. Government and contraction. *Linguistic Inquiry* 15: 465-473.

ATKINSON, M. 1992. *Children's syntax.* Oxford: Blackwell.

AUTHIER, J.-M. & L. REED. 2005. The diverse nature of noninterrogative *wh. Linguistic Inquiry* 36: 635-647.

BAKER, M.C. 2005. The innate endowment for language: Underspecified or overspecified? *In The innate mind: Structure and contents,* ed. P. Carruthers, S. Laurence & S. Stich, 156-174. Oxford: Oxford University Press.

BICKERTON, D. 1999. How to acquire language without positive evidence: What acquisitionists can learn from creoles. *In Language creation and language change,* ed. M. DeGraff, 49-74. Cambridge, Mass.: MIT Press.

BLOOM, P. 1999. The role of semantics in solving the bootstrapping problem. In *Language, logic, and concepts*, ed. R. Jackendoff, P. Bloom & K. Wynn, 285-309. Cambridge, Mass.: MIT Press.

BOECKX, C. 2003. *Islands and chains*. Amsterdam: John Benjamins.

BORER, H. 1984. *Parametric syntax*. Dordrecht: Foris.

BOŠKOVIČ, Z. 2001. *On the nature of the syntax-phonology interface*. Amsterdam: Elsevier.

CARRUTHERS, P., S. LAURENCE & S. STICH, eds. 2005. *The innate mind: Structure and contents*. Oxford: Oxford University Press.

CECCHETTO, C. 2004. Explaining the locality conditions of QR: Consequences for the theory of phases. *Natural Language Semantics* 12: 345-397.

CHOMSKY, N. 1965. *Aspects of the theory of syntax*. Cambridge, Mass.: MIT Press.

CHOMSKY, N. 1975. *Reflections on language*. New York: Pantheon.

CHOMSKY, N. 1981. *Lectures on government and binding*. Dordrecht: Foris.

CHOMSKY, N. 1986a. *Knowledge of language: Its nature, origins and use*. New York: Praeger.

CHOMSKY, N. 1986b. *Barriers*. Cambridge, Mass.: MIT Press.

CHOMSKY, N. 1995. *The Minimalist Program*. Cambridge, Mass.: MIT Press.

CHOMSKY, N. 2000. Minimalist inquiries: The framework. In *Step by step: Essays on minimalist syntax in honor of Howard Lasnik*, ed. R. Martin, D. Michaels & J. Uriagereka, 89-155. Cambridge, Mass.: MIT Press.

CHOMSKY, N. 2001. Derivation by phase. In *Ken Hale: A life in language*, ed. M. Kenstowicz, 1-52. Cambridge, Mass.: MIT Press.

CHOMSKY, N. 2002. *On nature and language*. Ed. A. Belletti & L. Rizzi. Cambridge: Cambridge University Press.

CHOMSKY, N. 2004. Beyond explanatory adequacy. In *Structures and beyond: The cartography of syntactic structures, Volume 3*, ed. A. Belletti, 104-131. Oxford: Oxford University Press.

CHOMSKY, N. 2005a. Three factors in language design. *Linguistic Inquiry* 36: 1-22.

CHOMSKY, N. 2005b. On phases. Ms., MIT, Cambridge, Mass.

CITKO, B. 2005. On the nature of merge: External merge, internal merge, and

parallel merge. *Linguistic Inquiry* 36: 475-496.

COLLINS, C. 2005. A smuggling approach to the passive in English. *Syntax* 8: 81-120.

CRAIN, S., A. GUALMINI & P. PIETROSKI. 2005. Brass tacks in linguistic theory: Innate grammatical principles. In *The innate mind: Structure and contents*, ed. P. Carruthers, S. Laurence & S. Stich, 175-197. Oxford: Oxford University Press.

CRAIN, S. & D. LILLO-MARTIN. 1999. *An introduction to linguistic theory and language acquisition*. Oxford: Blackwell.

CRAIN, S. & P. PIETROSKI. 2002. Why language acquisition is a snap. *The Linguistic Review* 19: 163-183.

DRESHER, B.E. 1999. Charting the learning path: Cues to parameter setting. *Linguistic Inquiry* 30: 27-67.

DRESHER, B.E. & J. D. KAYE. 1990. A computational learning model for metrical phonology. *Cognition* 34: 137-195.

EPSTEIN, S.D., E.M. GROAT, R. KAWASHIMA & H. KITAHARA. 1998. *A derivational approach to syntactic relations*. Oxford: Oxford University Press.

FITCH, W.T., M.D. HAUSER & N. CHOMSKY. 2005. The evolution of the language faculty: Clarifications and implications. *Cognition* 97: 179-210.

FODOR, J.A. 1983. *The modularity of mind*. Cambidge, Mass.: MIT Press.

FODOR, J.A. 2000. *The mind doesn't work that way*. Cambridge, Mass.: MIT Press.

FODOR, J.D. 1998. Unambiguous triggers. *Linguistic Inquiry* 29: 1-36.

FODOR, J.D. & C. CROWTHER. 2002. Understanding stimulus poverty arguments. *The Linguistic Review* 19: 105-145.

FOX, D. 2000. *Economy and semantic interpretation*. Cambridge, Mass.: MIT Press.

FRAMPTON, J. & S. GUTMANN. 1999. Cyclic computation, a computationally efficient minimalist syntax. *Syntax* 2: 1-27.

FRAMPTON, J. & S. GUTMANN. 2001. How sentences grow in the mind: Efficient computation in minimalist syntax. Ms., Northeastern University.

FRAMPTON, J. & S. GUTMANN. 2002. Crash-proof syntax. In *Derivation and*

explanation in the Minimalist Program, ed. S. D. Epstein & T. D. Seely, 90-105. Oxford: Blackwell.

FUJITA, K. 2005. Gengo o gengo tarasimeru mono (What makes language language). *Gengo* 34: 30-37.

FUKUI, N. 1986. A theory of category projection and its applications. Ph.D. dissertation, MIT, Cambridge, Mass.

GIBSON, E. & K. WEXLER. 1994. Triggers. *Linguistic Inquiry* 25: 407-454.

GILL, J.H. 1997. *If a chimpanzee could talk: and other reflections on language acquisition*. Tucson: The University of Arizona Press.

GLEITMAN, L. 1990. The structural sources of verb meaning. *Language Acquisition* 1: 3-55.

GRIMSHAW, J. 1981. Form, function and the language acquisition device. In *The logical problem of language acquisition*, ed. C.L. Baker & J. McCarthy, 165-182. Cambridge, Mass.: MIT Press.

GRODZINSKY, Y. & T. REINHART. 1993. The innateness of binding and coreference. *Linguistic Inquiry* 24: 69-101.

GUALMINI, A. 2005. *The ups and downs of child language: Experimental studies on children's knowledge of entailment relationships and polarity phenomena*. New York: Routledge.

GUASTI, M.T. 2002. *Language acquisition: The growth of grammar*. Cambridge, Mass.: MIT Press.

GUASTI, M.T., M. NESPOR, A. CHRISTOPHE & B. van OOYEN. 2001. Prelexical setting of the head complement parameter through prosody. In *Approaches to bootstrapping: Phonological, lexical, syntactic and neurophysiological aspects of early language acquisition, volume 1*, ed. J. Weissenborn & B. Höhle, 231-248. Amsterdam: John Benjamins.

HALLE, M., J. BRESNAN & G. A. MILLER, eds. 1978. *Linguistic theory and psychological reality*. Cambridge, Mass.: MIT Press.

HAUSER, M.D., N. CHOMSKY & W. T. FITCH. 2002. The faculty of language: What is it, who has it, and how did it evolve? *Science* 298: 1569-1579.

HEYCOCK, C. 2005. On the interaction of adjectival modifiers and relative clauses. *Natural Language Semantics* 13: 359-382.

HORWICH, P. 2003. Meaning and its place in the language faculty. In *Chomsky*

and his critics, ed. L.M. Antony & N. Hornstein, 162-178. Oxford: Blackwell.

HUANG, C-T.J. 1982. Logical relations in Chinese and the theory of grammar. Ph.D. dissertation, MIT. Cambridge, Mass.

JACKENDOFF, R. & S. PINKER. 2005. The nature of the language faculty and its implications for evolution of language (Reply to Fitch, Hauser, and Chomsky). *Cognition* 97: 211-225.

JENKINS, L. 2000. Biolinguistics: *Exploring the biology of language.* Cambridge: Cambridge University Press.

JENKINS, L., ed. 2004. *Variation and universals in biolinguistics.* Amsterdam: Elsevier.

KAYNE, R.S. 1994. *The antisymmetry of syntax.* Cambridge, Mass.: MIT Press.

KAYNE, R.S. 2000. *Parameters and universals.* Oxford: Oxford University Press.

KAYNE, R.S. 2005. *Movement and silence.* Oxford: Oxford University Press.

KEGL, J., A. SENGHAS & M. COPPOLA. 1999. Creation through contact: Sign language emergence and sign language change in Nicaragua. In *Language creation and language change*, ed. M. DeGraff, 179-237. Cambridge, Mass.: MIT Press.

KIGUCHI, H. & R. THORNTON. 2004. Binding principles and ACD constructions in child grammars. *Syntax* 7: 234-271.

KITAGAWA, Y. 1991. Binding under the internal subject hypothesis. In *Current English linguistics in Japan*, ed. H. Nakajima, 205-259. Berlin: Mouton de Gruyter.

KITAGAWA, Y. 2005. Seisei-bunpo no gengo-bunseki (The linguistic analysis of generative grammar). *Gengo* 34: 38-46.

KOOPMAN, H. 2005. Korean (and Japanese) morphology from a syntactic perspective. *Linguistic Inquiry* 36: 601-633.

LASNIK, H. & J. URIAGEREKA. 2002. On the poverty of the challenge. *The Linguistic Review* 19: 147-150.

LAURENCE, S. & E. MARGOLIS. 2002. Radical concept nativism. *Cognition* 86: 25-55.

LEGATE, J.A. 2003. Some interface properties of the phase. *Linguistic Inquiry* 34: 506-516.

LEGATE, J.A. & C.D. YANG. 2002. Empirical re-assessment stimulus poverty arguments. *The Linguistic Review* 19: 151-162.

LIGHTFOOT, D.W. 1994. Degree-0 learnability. In *Syntactic theory and first language acquisition: Cross-linguistic perspectives, volume 2: Binding, dependencies, and learnability*, ed. B. Lust, G. Hermon & J. Kornfilt, 453-471. Hillsdale, N.J.: Lawrence Erlbaum.

LIGHTFOOT, D.W. 1999. *The development of language: Acquisition, change, and evolution.* Oxford: Blackwell.

LIGHTFOOT, D.W. 2006. *How new languages emerge.* Cambridge: Cambridge University Press.

LÓPEZ, L. 2003. Steps for a well-adjusted dislocation. *Studia Linguistica* 57: 193-231.

LUDLOW, P. 2003. Referential semantics for I-languages? In *Chomsky and his critics*, ed. L.M. Antony & N. Hornstein, 140-161. Oxford: Blackwell.

MCGILVRAY, J., ed. 2005. *The Cambridge companion to Chomsky.* Cambridge: Cambridge University Press.

MCDANIEL, D. & T. MAXFIELD. 1992. Principle B and contrastive stress. *Language Acquisition* 2: 337-358.

MINAI, U., L. Meroni, & S. Crain. 2004. Children's non-local interpretation of quantification. In *Proceedings of the fifth Tokyo Conference on Psycholinguistics.* ed. Y. Otsu, 255-276. Tokyo: Hituji Syobo.

MIYAGAWA, S. 2005. On the EPP. In *MIT working papers in linguistics, volume 49: Perspectives on phases*, ed. M. McGinnis & N. Richards, 201-235. Cambridge, Mass.: MITWPL.

MULDERS, I. 2005. Transparent parsing: Phases in sentence processing. In *MIT working papers in linguistics, volume 49: Perspectives on phases*, ed. M. McGinnis & N. Richards, 237-264. Cambridge, Mass.: MITWPL.

NEVINS, A. 2005. Derivations without the activity condition. In *MIT working papers in linguistics, volume 49: Perspectives on phases*, ed. M. McGinnis & N. Richards, 283-306. Cambridge, Mass.: MITWPL.

NISSENBAUM. J.W. 2000. Investigations of covert phrase movement. Ph.D. dissertation, MIT. Cambridge, Mass.

NUNES, J. 2004. *Linearization of chains and sideward movement.* Cambridge,

Mass.: MIT Press.

PHILLIPS, C. 1996. Order and structure. Ph.D. dissertation, MIT, Cambridge, Mass.

PHILLIPS, C. 1998. Linear order and constituency. Ms., University of Delaware.

PIATTELLI-PALMARINI, M. & J. URIAGEREKA. 2004. The immune syntax: The evolution of the language virus. In *Variation and universals in biolinguistics*, ed. L. Jenkins, 341-377. Amsterdam: Elsevier.

PINKER, S. 1984. *Language learnability and language development.* Cambridge, Mass.: Harvard University Press.

PINKER, S. 1994. How could a child use verb syntax to learn verb semantics? *Lingua* 92: 377-410.

PINKER, S. & R. JACKENDOFF. 2005. The faculty of language: what's special about it? *Cognition* 95: 201-236.

RACKOWSKI, A. & N. RICHARDS. 2005. Phase edge and extraction: A Tagalog case study. *Linguistic Inquiry* 36: 565-599.

REINHART, T. 1983. *Anaphora and semantic interpretation.* London: Croom Helm.

REINHART, T. 2004. The processing cost of reference set computation: Acquisition of stress shift and focus. *Language Acquisition* 12: 109-155.

REULAND, E. 2001. Primitives of binding. *Linguistic Inquiry* 32: 439-492.

REY, G. 2003. Chomsky, intentionality, and a CRTT. In *Chomsky and his critics,* ed. L.M. Antony & N. Hornstein, 105-139. Oxford: Blackwell.

RICHARDS, N. 2001. *Movement in language.* Oxford: Oxford University Press.

ROBERTS, I. 2001. Language change and learnability. In *Language acquisition and learnability*, ed. S. Bertolo, 81-125. Cambridge: Cambridge University Press.

ROSS, R. 1967. Constraints on variables in syntax. Ph.D. dissertation, MIT, Cambridge, Mass.

SAKAI, K. 2002. *Gengo no nou-kagaku (The brain science of language).* Tokyo: Chuo-koron Shinsha.

SAUSSURE, F. de. 1968/1983. *Course in general linguistics.* Trans. by R. Harris. London: Duckworth.

SCHWABE, K. & S. WINKLER, eds. 2003. *The interfaces: Deriving and inter-*

preting omitted structures. Amsterdam: John Benjamins.

SUZUKI, N. 2001. Minimalism and its implications for language acquisition and learnability. In *Kobe Shinwa studies in English linguistics and literature 21*, 14-43. Kobe: Society of English Linguistics and Literature, Kobe Shinwa Women's University.

SUZUKI, N. 2002. Triggers, minimalism, and learnability. In *Kobe Shinwa studies in English linguistics and literature 22*, 1-29. Kobe: Society of English Linguistics and Literature, Kobe Shinwa Women's University.

SUZUKI, N. 2003. Universals, Occam's razor, and the strong minimalist thesis. In *Kobe Shinwa studies in English linguistics and literature 23*, 1-17. Kobe: Society of English Linguistics and Literature, Kobe Shinwa Women's University.

SUZUKI, N. 2005. How the reality can be compatible with the strong minimalist thesis: Interfacing, economy, and variation. In *Kobe Shinwa studies in English linguistics and literature 24*, 1-92. Kobe: Society of English Linguistics and Literature, Kobe Shinwa Women's University.

TANAKA, H. 1997. Invisible movement in sika-nai and the linear crossing constraint. *Journal of East Asian Linguistics* 6: 143-178.

TERADA, H. 1999. Successive cyclicity and incrementality. *English Linguistics* 16: 243-274.

TERADA, H. 2002. On θ -checking. *English Linguistics* 19: 1-28.

THORNTON, R. & K. WEXLER. 1999. *Principle B, VP ellipsis, and interpretation in child grammar*. Cambridge, Mass.: MIT Press.

URIAGEREKA, J. 1999. Multiple spell-out. In *Working minimalism*, ed. S.D. Epstein & N. Hornstein, 251-282. Cambridge, Mass.: MIT Press.

WEISSENBORN, J. & B. HÖHLE. 2001. Introduction. In *Approaches to bootstrapping: Phonological, lexical, syntactic and neurophysiological aspects of early language acquisition, Volume 1*, ed. J. Weissenborn & B. Höhle, vii-xvii. Amsterdam: John Benjamins.

WEXLER, K. & P. W. CULICOVER. 1980. *Formal principles of language acquisition*. Cambridge, Mass.: MIT Press.

YANG, C.D. 2002. *Knowledge and learning in natural language*. Oxford: Oxford University Press.

YANG, C.D. 2004. Toward a theory of language growth. In *Variation and universals in biolinguistics*, ed. L. Jenkins, 37-56. Amsterdam: Elsevier.

YUSA, N. 2005. Seibutsu-gengogaku to-siteno daini-gengo-kakutoku-kenkyu (Studies in second language acquisition as biolinguistics). *Gengo* 34: 48-55.