For and Against the "Poverty of Stimulus" Argument

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1. Introduction

The argument of poverty of stimulus (APS) has been a central concern in generative tradition. Children are exposed to very limited and personal linguistic data, but their knowledge of grammar is built up systematicaly, unless they do not have particular deficiencies. Importantly, they know innate rules of language which cannot be deduced from input data. This is a fact of interest and a clue to linguistic nativism as discussed in Chomsky (1986 and others): We have innate knowledge dedicated to language, the faculty of language (FL). Generative grammarians argue for the validity of FL, and try to clarify the intricate mechanisms.

However, some people, who advocate empiricism initiated by B. F. Skinner, have raised objection to the proposal of nativists for a long time and now it goes on. For example, Pullum and Scholz (2002) (henceforth P&S) insist that linguistic nativism cannot reject the assertions by empiricists perfectly until now.[1] They ask nativists whether stimulus is really poor or not, and exhaustively present some empirical discussions. Lasnik and Uriagereka (2002) and Legate and Yang (2002) wrestle with this question, and they conclude that the discussion of APS in P&S would be difficult to maintain as a view of language acquisition.[2,3]

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[1] They are just casting discredit on nativism, so their positions do not necessarily support empiricism.

[2] In Lasnik and Uriagereka (2002), they discuss the phenomenon of subject auxiliary inversion (SAI). Assume that the acquisition of SAI results from generalization procedures from input data, children cannot learn it without negative evidence. The hypotheses gotten from generalization of a data are manifold, not only one. Thus children have to explore an appropriate hypothesis among various candidates. If P&S's suggestion is on the right track, children have to select it with assist of negative evidence. However, it cannot be guaranteed that negative evidence is provided for every child uniformly. Therefore, assume that people are equipped with a priori knowledge of language, they can get some data and acquire their languages properly along the guideline, Lasnik and Uriagereka conclude.

[3] Legate and Yang (2002) challenge the analysis of P&S with respect to the amount of input data relevant with SAI. P&S estimate that 0.1-1.0% of all adult input sentences is regarded as the relevant data. On the other hand, Legate and Yang take exception to this estimate. They argue

In this paper, the problem of auxiliary sequences, one of the phenomena provided by P&S, is mainly discussed, and it is claimed that linguistic nativism is a surely promising view, in agreement with Lasnik and Uriagereka (2002) and Legate and Yang (2002).

2. Nativism vs Empiricism: A Case Study in Auxiliary Sequences

2.1 A Review of Kimball (1973) in P&S

First of all, P&S introduce the idea by Kimball (1973), and amplify their argument based on it. Kimball presents the following sentences in (1), and mentions that their structures can be described by the rule schema advocated in Chomsky (1957) in (2).

(1)   a. It rains.

        b. It may rain.

        c. It may have rained.

        d. It may be raining.

        e. It has rained.

        f. It has been raining.

        g. It is raining.

        h. It may have been raining.

(2)   Aux → T (M) (have+en) (be+ing)

(Pullum and Scholz 2002: 27)

In (1), Auxiliary Sequence (AS) in English is illustrated, and each sentence has some auxiliaries. (2) expresses the structure, and the parenthetical items mean optional ones. For example, (1b) has only *M(odal) may* but does not have the others. However, they are optional elements. Therefore, (1b) is grammatical. On the other hand, (1h) has every item in (2), *may have been raining.* It is also grammatical.

Moreover, Kimball (1973) observes the following opinion on learnability of AS, cited in P&S:

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that the proportion of the relevant data is closer to 0.0068% on their investigation. Furthermore, on the basis of the fact that SAI is acquired around age 3 and also the Null Subject Parameter is learned at about the same time, the data of SAI is much less than the ones relevant to null subject parameter. The latter has a percentage closer to 1.2%. If children learn SAI based on generalization from input data, they claim that the amount of input data, for phenomena acquired at about the same age, should be around the same percentage range. Children can acquire the relevant phenomena at a certain age in spite of the fact that there is the discrepancy in the amount of data. Therefore, Legate and Yang (2002) conclude that this discrepancy can only be explained by a theory of innateness at this time.

(3)   It may be thought that the language learner acquires the full system of the
        auxiliary by hearing examples of sentences of each type, i.e., sentences like
        each of those listed ...   However, sentences in which the auxiliary is fully
        represented by a modal, perfect, and progressive are vanishingly rare.   One
        computerized sample of more than a million sentences from educated, written
        text yielded no sentence like [*It may have been raining*].   Further, one
        observer remarked that after eight years of attention to the problem, he had
        found [such] sentences... fewer than dozen times in conversation.

        Thus, the evidence indicates that a great many English-speaking children will
        acquire the full auxiliary system... without having head sentences directly
        illustrating each of the rules.

                                                                        (Kimball 1973: 74)

Kimball thinks that children come to know the right system of AS with hearing the
subset of all possible patterns of AS.   For example, a type of (1h) *It may have been
raining* appears to be the most complex structurally, so children do not always
encounter that kind of input.   Therefore, it is hard for children to acquire the full
auxiliary system from only auditory input data.   At last, it is implied that some innate
ability assists children in acquiring AS.   Based on the above discussion, P&S
summarize the acquisition of AS with innate knowledge by Kimball from the viewpoint
of APS in the following.

(4)   APS specification for auxiliary sequences[4]
        a. ACQUIRENDUM: the rule schema (2).
        b. LACUNA:
            the set of all sentences exhibiting the sequence "tensed modal auxiliary +
            perfect *have* + progressive *be* + present participial verb" (hereafter, MHBV
            sequence).

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[4] P&S provide the following APS specification schema, and (4) is based on it.
[1] *APS specification schema*
    a. ACQUIREDUM CHARACTERIZATION: describe in detail what is alleged to be known.
    b. LACUNA SPECIFICATION: identify a set of sentences such that if the learner had access to
       them, the claim of data-driven learning of the acquirendum would be supported.
    c. INDISPENSABILITY ARGUMENT: give reason to think that if learning were data-driven then
       the acquirendum could not be learned without access to sentences in lacuna.
    d. INACCESSIBILITY EVIDENCE: support the claim that tokens of sentences in the lacuna were
       not available to the learner during the acquisition process.
    e. ACQUISITION EVIDENCE: give reason to believe that the acquirendum does in fact become
       known to learners during childhood.

      c. INDISPENSABILITY ARGUMENT:

         without hearing examples containing an MHBV sequence it is not possible

         to learn that such sequences are grammatical.

      d. INACCESSIBILITY EVIDENCE:

         clauses containing an MHBV sequence are "vanishingly rare".

      e. ACQUISITION EVIDENCE:

         trivial, since it is undisputed that everyone who speaks English knows that

         MHBV sequences are grammatical.

                                       (Pullum and Scholz 2002: 28)

2.2 P&S's Proposal: Against Kimball (1973)

As sketched above, Kimball concludes that innate knowledge enables us to get to the full auxiliary system because of rarity of the data, MHBV sequence. However, P&S assert that the inaccessibility claim in (4d) is vague. According to their survey, they found hundreds of AS examples, and almost every novel example among the investigation has some relevant data. Some of them are presented below.

(5)   a. You *should have been attending* to the lesson.

        b. ... when I *should have been studying.*

                           (Lucy Maud Montgomery, *Anne of Green Gables*)

(6)   a. (from Jonathan Harker's diary) I *must have been sleeping* soundly.

        b. (from Lucy Westenra's diary) I *must have been falling* asleep.

                                   (Bram Stoker, *Dracula*)

(7)   a. ... *might have been exchanging* jokes.

        b. ... *must have been thinking* of himself.

        c. ... *might have been alluding.*

        d. ... *might have been discussing.*

        e. ... *might have been hiding* in the bushes.

                                   (Joseph Conrad, *Lord Jim*)

(8)   a. ... *must have been drinking.*

        b. ... *must have been dreaming.*

                                   (Herman Melville, *Moby Dick*)

(9)   a. I *should have been dressing* the children.

        b. Your sister *would have been living* now.

                                 (Emily Brontë, *Wuthering Heights*)

(10)   a. We stand together again at the step of this symbol of our democracy — or
             we *would have been standing* at the steps if it hadn't gotten to cold...
             (President Ronald Reagan's inaugural address [delivered inside the Capitol
                         instead of the usual place, the steps of the Lincoln Memorial])
                                                           (Pullum and Scholz 2002: 28-29)

These sentences contain the MHBV sequences.   Furthermore, P&S show that classic
children's books also have this kind of sentences as in (11)-(13).   Therefore, it is
expected that children can be exposed to the relevant input data.

(11)   ... *must have been dreaming.*

                                                   (Luwis Carroll, *Through the Looking Glass*)
(12)   You *must have been thinking* again.

                                                   (L. Frank Baum, *The Wonderful Wizard of Oz*)
(13)   a. It *would not have been fighting* fair.
         b. Oh, surely she *must have been dreaming.*

                                                           (J.M. Barrie, *Peter Pan*)
                                                           (Pullum and Scholz 2002: 29)

Since there are many data with MHBV sequences, P&S think that almost everyone
probably hears these phrases at some time early in life.   However, P&S say, "How
many cases does one have to find to challenge Kimball's claim that these constructions
are *vanishingly rare*?"   That is, Kimball's expression *rare* in (4d) is not clear-cut.
However more evidence P&S show, no one understands whether or not the amount is
enough to acquire AS.   Finally, if the evidence with MHBV sequences is not enough,
the APS advocates, including Kimball (1973), should tell P&S why not.

     Secondly, the problem concerns the acquirendum in (4a) and (2).   P&S argue that
the rule schema as in (2) fails to describe English syntax as suggested in Ross (1969),
Pullum and Wilson (1977), Gazdar, Pullum and Sag (1982) etc.   They think that all
English auxiliaries are verbs taking complements.   Moreover they continue to say, "If
auxiliaries are complement-taking verbs, there is no need to assume that strings like
may have been writing must be heard before their grammaticality can be known".
That is, P&S assumes that children can get the following complement type selections
from simple examples:

(14)   *may have been writing*

      a. Verbs like *may* occur with bare infinitival complements.

      b. *have* occurs with past participial VP complements.

      c. *been* is the past participle of *be*.

      d. *be* occurs with present participial VP complements.

      e. *writing* is the present participle of *write*.

These selections (14a-e) enable children to know the fact that the strings of *may have been writing* is grammatical, without hearing the relevant strings. In conclusion, the rule (2) by Kimball (1973) is not right, and that innate knowledge is no longer needed in P&S's acquisition theory—complement type selection.

    Lastly, P&S consider the relation between learning from experience and assuming innate knowledge. In the discussion on APS, one assumes the following:

(15)   There is a rule of language R.

      Despite the fact that R cannot be learned from experience, people know it.

      Therefore, R is innate knowledge of language.

However, P&S claim that the assumption of (15) would be rather radical, because the following discussion would hold true if (15) were on the right track.

(16)   There is a rule of architecture, furnishing and appliances R.

      Despite the fact that R cannot be learned from experience, people know it.

      Therefore, R is innate knowledge of house.

To put it more concretely, people learn at a very young age that houses contain rooms, and rooms are of different types such as kitchens and bedrooms; that nearly all houses have both kitchens and bedrooms; that cookers and sinks are found in kitchens, and sinks have taps, and faucets produce water; that dressers are found in bedrooms, and dressers have drawers, and drawers have knobs; and so on. Moreover, we also know that dressers with faucets are impossible, in spite of the fact that we cannot learn it from experience directly and are not given any explicit negative evidence. If (15) is an appropriate assumption, there must be innate domain-specific knowledge. Of course, we do not have that kind of innate knowledge. Therefore, P&S conclude that APS, (15), is rather radical.

    As stated above, P&S critically reviewed Kimball (1973), and their original claim on

the acquisition of AS was amplified. Finally, P&S suggest that children have sufficient opportunities for acquiring AS from experience, without innate knowledge of language, in contrast to APS.

2.3 Some Problems in P&S: APS is Still Maintained.

In this section, some discussions are developed against P&S, and it is concluded that APS, nativism, can be still supported in the acquisition of AS.

2.3.1 Stimulus is Poor as Ever.

P&S present much evidence of MHBV sequences as in (5)-(13), and P&S think that almost everyone probably hears these phrases at some time early in life. Therefore, stimulus is rich in their opinion. Finally, P&S argue that the APS advocates should tell them why the evidence with MHBV sequences is not enough.

In contrast to P&S, I propose that stimulus is poor, not rich, because the following two reasons are firm. First, it is not guaranteed that every child is exposed to the evidence of MHBV uniformly, however many data there are. Functional items like auxiliaries are not as obligatory elements in sentences as subjects, objects and verbs. That is, it means that auxiliaries are not required in order to satisfy argument structures. Especially, it is clear-cut that MHBV sequences are less than subjects, objects and verbs in input data. Therefore, MHBV cannot be treated like the obligatory elements in sentence, and it seems to be very easy to claim that every child encounters the relevant evidence uniformly.

The other reason seems to be stronger than the above one. P&S show much evidence with MHBV sequences, and claim that stimulus is no longer poor at least in the case of acquisition of AS. In fact, that discussion cannot deny APS, because APS means that the amount of stimulus is poor in the quality as well as in the amount. Therefore, however a large number of data P&S find, it cannot rebut APS. What is the poverty of stimulus in the quality?

Generative grammarians assume the innate knowledge dedicated to language. One of the elements constituting the knowledge of language is phrase structure. The phrase structure designs natural languages hierarchically. It means that words in a sentence are not linked linearly but are dominated by hierarchical relation. This is a firm assertion in generative tradition, and many empirical data prove the validity. For example, application of transformational rules to natural language is a structure-dependent operation. Concerning this problem, Crain and Nakayama (1987) provide a concrete example. In their terms, structure-dependent operation and

structure-independent operation are defined as in the following:

(17)   A structure-dependent operation is one which is based on the abstract
         structural organizations of word sequences.
         By contrast, structure-independent operations apply to sequences of words
         themselves, and include operations like NEXT and CLOSEST which are
         contingent on linear order.[5]

                                                    (Crain and Nakayama 1987: 522)

Based on the definition, Crain and Nakayama discuss an operation of subject auxiliary
inversion (SAI) as in (18), based on Chomsky (1971).

(18)   a. The man is tall. → Is the man tall?
         b. The book is on the table. → Is the book on the table?
         c. I can go. → Can I go?

                                                    (Crain and Nakayama 1987: 525)

SAI is an operation on yes/no question formation as (18). Is this operation structure-
dependent or independent? If SAI is a structure-independent operation, the
hypothesis as in (19) must be supported.

(19)   Hypothesis I: In yes/no questions, the leftmost verbal element of a declarative
                       (*is, can* etc.) has been moved to the front of the sentence.

                                                    (Crain and Nakayama 1987: 525)

The Hypothesis I can predict SAI in (18) properly. In every sentence of (18), the
leftmost verbal elements are fronted in order to form yes/no questions. However, the
Hypothesis I cannot account for (20), because the leftmost verbal element is not
appropriate auxiliary which can be fronted.

(20)   The man who is tall is in the other room.
         → a. *Is the man who __ tall is in the other room?

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[5] In Crain and Nakayama (1987)'s footnote 2, moreover, it is shown that the following can be
considered structure-independent.
[1] a. It is an operation on strings of words, rather than on their structural representations.
     b. It mentions only linear relations.
A rule which satisfies both of these conditions is clearly structure-independent.

→ b. Is the man who is tall __ in the other room?

<div align="right">(Crain and Nakayama 1987: 525)</div>

According to the Hypothesis I, it is incorrectly predicted that (20a) is well-formed and (20b) is ill-formed, in that the leftmost verbal element *is* is correctly inverted in (20a) but the fronted *is* in (20b) is not the leftmost in the sentence.   However, (20) is not the case.   Indeed, (20b) is well-formed.   If SAI is regarded as a structure-dependent operation, (20) can be captured properly by the Hypothesis II in (21).

(21)   Hypothesis II: In yes/no questions, the auxiliary verb in the main clause of a
          declarative is inverted with the subject noun phrase.

<div align="right">(Crain and Nakayama 1987: 526)</div>

The Hypothesis II can explain the grammaticality of (20) and (18).   That is, the formation of yes/no questions requires a structural analysis of a sentence into phrase structure like NP or VP, and into different levels of structure like main clause or subordinate clause.   Therefore, Crain and Nakayama (1987) think that the structure-dependent hypothesis like (21) is needed, whereas the structure-independent hypothesis like (19) should be rejected.[6]

     Turning to the acquisition of AS again, the achievement by Crain and Nakayama (1987) is also supported.   If we do not have phrase structure as the innate knowledge of language, how do children analyze the following types of sentences with auxiliary sequences?

(22)   a. The book which John *must buy was sold* in that store.
          b. The man whom Mary *will meet may be arrested* tomorrow.
          c. Which students would you *say have got* most out of the course?
          d. Who do you *think is helping* him?

Since (22) is grammatical, they can become input.   Assuming that AS is structure-independent, (22) is analyzed in the linearity.   Therefore, the italicized linear sequences must be regarded as grammatical ones.   However, these linear sequences are in fact ungrammatical.

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[6] In Crain and Nakayama (1987), moreover, the validity of Hypothesis II is confirmed by some experiments.   Especially, it is clarified by the experiment that children do not make any mistakes based on Hypothesis I like types of (20a) through their developmental stages.

(23) a. *The book *must buy was sold.*
      b. *The man *will meet may be arrested.*
      c. *I *say have got* most out of the course
      d. *You *think is helping* him

Ungrammaticality of (23) informs us that AS is not structure-independent, for sure. Since we are endowed with phrase structure, one of the knowledge of language, we can decode the sentences in (22) properly: *must buy* is an auxiliary and verb in the relative clause, whereas *was sold* is in the main clause.   Thus, people do not understand the sentences linearly.

    As noted above, however many stimuli there are in the amount, stimulus is still poor in the quality for acquisition of AS, because we cannot learn AS without any assistance of innate knowledge, in contrast with P&S's discussion.

2.3.2 Against the Sub-Categorization Theory in P&S

P&S suggest that auxiliaries are verbs taking complements, so the following sub-categorization is executed based on simpler input, in order to acquire the full auxiliary system.

(14) *may have been writing*
      a. Verbs like *may* occur with bare infinitival complements.
      b. *have* occurs with past participial VP complements.
      c. *been* is the past participle of *be*.
      d. *be* occurs with present participial VP complements.
      e. *writing* is the present participle of *write*.

For example, in the case of *may have been writing*, we can properly generate the sequences without hearing it directly, because the sub-categorization as in (14) can be generalized from other simpler input — *You may go, I have been to America* and so on. Thus, P&S insist that the sub-categorization theory enables us to understand AS without any innate ability, so stimulus is enough to acquire AS.

    However, the sub-categorization theory itself seems to be supportive for innate knowledge of language, APS, partly.   In (14), P&S use some abstract phrase structure, *VP* or *bare infinitive*.   As mentioned in the previous section, the knowledge of phrase structure is one of the innate abilities of language.   Based on that innate knowledge, we can analyze input data properly: *have* selects VP as the complement.   Pinker

(1998) observes on this point as in the following:

(24)   Grammar can express a remarkable range of thoughts because our knowledge
        of language resides in an algorithm that combines abstract symbols, such as
        "Noun" and "Verb", as opposed to concrete concepts such as "man" and "dog" or
        "eater" and "eaten". This gives us an ability to talk about all kinds of wild
        and wonderful ideas. We can talk about a dog biting a man, or, as in the
        journalist's definition of "news", a man biting a dog. ... All kinds of unexpected
        events can be communicated, because our knowledge of language is couched in
        abstract symbols that can embrace a vast set of concepts and can be combined
        freely into an even vaster set of propositions.

                                                                    (Pinker 1998: 221)

As noted in Pinker (1998), we have an algorithm as innate knowledge, and it enables
us to combine the verb *hit* with the abstract symbol *V*. Therefore, in virtue of the
algorithm, people can regard [*hit Mary*] as VP. Moreover, the sentences like (22)
cannot be also construed correctly without the relevant algorithm, as discussed in the
previous section. Therefore, with the innate knowledge of language assumed, the
sub-categorization theory in P&S can be supported.

    If we do not have any means for analyzing the input data, input data cannot be
beyond as they are. For we have the means innately, input data can be beyond as
they are and we can establish our appropriate grammar of language. Therefore, it is
still firm to posit the innate knowledge of language.

2.3.3 On the Steady State of Universal Grammar (UG)

So far, the discussion supporting nativism has been extended. Moreover, empiricism
has another problem, if we are not endowed with the knowledge of language, suggested ·
in P&S. It concerns the nature of our knowledge of language.

    As sketched above, we cannot learn anything beyond data itself, if we do not have
any innate knowledge of language. Therefore, it means that we cannot generate a
sentence before hearing it without innate knowledge of language. As discussed in
Pinker (1998), however, our utterance has manifolds and infinity. Also, we utter
many sentences which we have never heard. Nevertheless, we can speak them
without grammatical failure. At the same time, we can also understand many
sentences which we have never heard, and can judge the grammaticality by our
linguistic intuition. Take a well-known sentence for example.

(25)   Colorless green ideas sleep furiously.

<div align="right">(Chomsky 1965)</div>

(25) is un-interpretable only in semantic side. However, people can judge that this sentence is correct in syntactic side, if they are native speakers of English. Since we cannot understand the message of this sentence and cannot imagine the context or situation, this kind of sentences does not exist in ordinary utterances (i.e. in input data). Why can native speakers of English judge the grammaticality? The reason is that we have an abstract grammatical structure in the mind/brain. By virtue of grammar as an abstract representation, we can react to every type of sentences grammatically. Without assuming innate knowledge of language, it cannot be explained that language has infinity and manifold as the nature.

In addition, the language, acquired based on empiricism, has any imperfection, in that stimulus of language is unlimited, because our utterances can be generated un-limitedly. However, people can judge the grammaticality of every sentence. It means that acquired grammar should not have any imperfection. According to Chomsky (1981), it is assumed that UG is constituted of finite principles and parameters, called P&P approach. UG arrives at the steady state (S_s) through setting parameters by data. The steady state means a particular grammar, and to attain that state means that language acquisition, parameter-setting, has finished. That is, S_s, steady state, is perfect grammar of language.

(26) $S_0, S_1, S_2 \ldots \ldots S_s$

By means of treating infinity of language as finite principles and parameters in accordance with Chomsky (1981), we can get a grammar without any imperfection. In conclusion, the nature of language like this is also an open question in empiricism approach.

2.3.4 A Crucial Difference between the Knowledge of Language and General Common Sense

In the above sections, the necessity of innate knowledge of language has been mentioned consistently. In this section, finally, I argue that the proposal of P&S on the relation between learning from experience and assuming innate knowledge seems to be unreasonable.

P&S argue that the following two assumptions must be consistent.

(15)   There is a rule of language R.

Despite the fact that R cannot be learned from experience, people know it.

Therefore, R is innate knowledge of language.

(16)   There is a rule of architecture, furnishing and appliances R.

Despite the fact that R cannot be learned from experience, people know it.

Therefore, R is innate knowledge of architecture, furnishing and appliances.

Are rules of both language and architecture regarded as the same kind of knowledge, in essence? In fact, they cannot be the same, because the knowledge of language is one of the natures of human beings. Every person has the knowledge universally. On the other hand, the knowledge of architecture is not universal for every person, but is general common sense. Indeed, we know something about architecture. However, the depth of knowledge is different for each person. For example, architects and builders know it in detail and more deeply than ordinary people. But in the case of language, the difference does not exist. Our linguistic intuition is equal ability for every person. In fact, the knowledge of language is distinct from the knowledge of architecture. Therefore, it would be unreasonable to say that the discussion of (16) is parallel with (15) in essence. Also, APS is not radical but so much firm, contra P&S's suggestion.

3. Summary and Concluding Remarks

In this paper, it was argued consistently that linguistic nativism is still supported, contra P&S's prediction. As an example, the acquisition of AS presented in P&S was focused on. P&S claimed that stimulus is not poor in fact, because there is much evidence with AS in some books including children's books. Moreover, their theory, the sub-categorization theory, enables us to acquire the full auxiliary system, even if there is a little input. However, this analysis involved some problems as mentioned in 2.3. Ultimately, P&S's theory itself needs to assume the innate knowledge of language, and stimulus was still poor. Although P&S insisted that linguistic nativism cannot reject the assertions by empiricists perfectly until now, the discussion here would reject empiricism approach at least in the case of AS.

Again, P&S's discussion is also critically considered by Lasnik and Uriagereka (2002) and Legate and Yang (2002) as mentioned in the footnot 2 and 3. In these papers, the problem of SAI is also discussed, and both studies result in supporting the

innateness of linguistic knowledge empirically.[7]   Also regarding this point, empiricists are exposed to criticism.   It seems reasonable to conclude that nativism, APS, remains true and the proposal of P&S is not regarded as an appropriate refutation to APS.

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[7] Scholz and Pullum (2002) raise objection to Lasnik and Uriagereka (2002) and Legate and Yang (2002).   However, those objections seem to be ambiguous and not to refute the opponents properly. Therefore, the discussion in Scholz and Pullum (2002) is not considered here.