Is a bioprogram necessary to explain the acquisition of tense-aspect morphology?

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Bickerton (1981, 1984a) proposed the Language Bioprogram Hypothesis to account for commonalties among genetically unrelated creole languages. In support of this theory he argues that some phenomena in first language acquisition cannot be explained without such a bioprogram. In particular, he proposed that the acquisition of tense-aspect morphology in French, Italian, English, and Turkish can only be accounted for by assuming that children know in advance the distinctions between State and Process and between Punctual and Non-Punctual. This paper proposes an alternative account which does not rely on an innate bioprogram. Based on previous studies of the acquisition of verb morphology and the distributional pattern in native speech in various languages, this paper argues that the acquisitional pattern which Bickerton attributes to innate knowledge can be accounted for by distributional bias in the input. Essentially, this paper proposes that children form their initial prototypes of tense-aspect markers based in part on the correlational bias between verb types and tense-aspect markers in the input they are exposed to. This paper concludes with a caution against relying on innateness explanations for language acquisition phenomena without exploring other possible explanations.

Keywords: Language Bioprogram Hypothesis, tense-aspect morphology, inherent aspect, input, prototype formation

1. Introduction

It has been argued that innate constraints are at work in various aspects of linguistic development. This paper focuses on one particular domain of linguistic development — that of tense-aspect morphology — to examine the validity of such a claim.

Bickerton (1981, 1984a) proposed the Language Bioprogram Hypothesis, based primarily on his research on the genesis of creole languages. Observing that even genetically unrelated creole languages share common linguistic features in domains as varied as the causative construction, nominal specificity, and tense-aspect morphology. Bickerton hypothesized that these commonalties must come from a bioprogram — i.e., knowledge that is innately specified for all human children. Bickerton’s argument is that the commonalties among genetically unrelated creole languages can be explained only if we postulate that children modify the pidgin input they are exposed to in ways that are compatible with the bioprogram.

In support of this hypothesis, Bickerton also discussed studies from first language ac-
quisition, and claimed that the acquisition data support the bioprogram hypothesis. His general hypotheses regarding first language acquisition were:

1. Children mark the distinctions that the bioprogram tells them to mark, even if these distinctions are not marked in the input language.

2. Children do not have difficulty — i.e., they do not make errors — in acquiring the distinctions that are part of the bioprogram.

Recent studies on the role of input on children’s acquisition of tense-aspect morphology, however, offer an alternative explanation — namely, that the distribution pattern in the input influences children’s category formation. In what follows, I will bring these recent studies to bear on Bickerton’s argument that children’s acquisition patterns can only be explained by assuming that children are equipped with these distinctions1).

2. Language Bioprogram Hypothesis

2.1 Terminology

Before we discuss Bickerton’s proposal, some terminology of tense and aspect must be reviewed. This is important because in the area of tense-aspect, researchers often use different terminology, which has resulted in much confusion in the field (see Cziko, 1989; Bickerton, 1989; Weist, 1989). Below I will restate some widely accepted definitions on tense-aspect (see Comrie, 1976; Smith, 1991 for further discussion).

Tense locates a situation in relation to another reference point in time, and therefore is deictic. For example, English simple past tense locates a situation in relation to the speech time as the reference point. Aspect, on the other hand, concerns the temporal contour of the situation to be described by the verb (phrase).

There are three levels of aspect that need to be considered in this paper — real world situation, inherent aspect, and grammatical aspect. ‘Real world situation’ is self-explanatory; it concerns the situational properties that are out there in the real world (or in the speaker’s conceptual world) that we often seek to describe through linguistic expressions. Inherent aspect (otherwise known as situation aspect or aktionsart) refers to the semantic characteristics of the predicate-argument structure. Vendler’s (1957) four classes (achievement, accomplishment, activity, state) are the most well-known:

State: love, exist, contain, know, believe, think that...
Activity: run, walk, think about..., play the guitar
Accomplishment: make a chair, walk to the store
Achievement: reach the summit, die, win the race, notice

1) It should be noted at the outset that Bickerton (1981) is rather old, and that Bickerton (1989) himself notes that his position has changed (see also Bickerton, 1988). However, his new position does not fully expound on the acquisition of tense-aspect. Since his original proposal was the most influential in motivating subsequent research, I will mainly focus on Bickerton (1981). Furthermore, Muysken (1988) suggests that Bickerton’s (1988) new proposal, which is more in line with the Chomskyan approach to language acquisition, is problematic, and less interesting than his old proposal.
State terms refer to stative situations that do not change unless some other force changes them. States are stative, while the other three classes are dynamic. Among the dynamic situations, activity terms involve duration, but they do not have an inherent endpoint. That is, one can stop the action at any time point, but the fact remains that the action has been done. Activity is therefore atelic (non-telic), not involving an inherent endpoint. Accomplishment terms, on the other hand, are telic, involving a necessary endpoint. One cannot truthfully say she made a chair if she stops in the middle of making a chair. Finally, achievement terms refer to situations that are linguistically conceived as punctual or instantaneous. Achievements, therefore, are [+punctual] and [+telic].

Grammatical aspect, on the other hand, is typically realized by inflections and auxiliaries, which normally consist of grammaticized lexical items (Bybee, Perkins, & Pagliuca, 1994). It denotes what Smith (1983, 1991) calls ‘viewpoint aspect,’ such as imperfective, perfective, progressive, which specifies how the speaker views the situation to be described. Perfective aspect presents a situation as a totality (external view), while imperfective aspect focuses on the internal structure of a situation (internal view) (Comrie, 1976). Progressive is a type of imperfective, with an added component of dynamicity. To illustrate using languages that we will be discussing further in this paper, English has a progressive aspect, while French and Italian both have perfective past and imperfective past.

Bickerton’s (1981) punctual-nonpunctual distinction, in fact, can operate at any of the three levels discussed. At the level of situational properties, his punctuality refers to lack of duration in the real world. At the level of inherent aspect, his punctuality refers to telicity — involving an inherent endpoint for change-of-states. At the level of grammatical aspect, his punctual-nonpunctual distinction roughly corresponds to the perfective-imperfective distinction.

2.2 SPD (State-Process Distinction) and PNPD (Punctual-Nonpunctual Distinction)

Bickerton (1981) postulated two types of distinctions that human children are innately endowed with: the SPD (the State-Process Distinction) and the PNPD (the Punctual-Non-Punctual Distinction), both of which he claimed are grammatically marked in all “true” creole languages as defined by him. He reviewed studies in the acquisition of French (Bronckart & Sinclair, 1973) and Italian (Antinucci & Miller, 1976) in support of the PNPD, and studies in English (Brown, 1973; Kuczaj, 1978) and Turkish (Slobin & Aksu, 1980) in support of the SPD.

Regarding the PNPD, it was observed that children acquiring French and Italian tend to attach past marking to ‘punctual’ (i.e., telic) verbs, but not to ‘nonpunctual’ (i.e., atelic) verbs (Bronckart & Sinclair, 1973; Antinucci

2) Smith (1991) proposes a fifth category, which is punctual but atelic, such as jump, kick, knock. Although this revision of the Vendlerian verb classification has important consequences for the acquisition of tense-aspect (Shirai & Andersen, 1995; Shirai, in press), in this paper I will use the four-way classification to simplify the discussion.
Based on this observation, Bickerton claimed that children are marking ‘punctuality’ rather than pastness when they use past morphology. This, according to him, then supports hypothesis (1) above: namely, children mark the distinction that the bioprogram tells them to mark, even if the distinction is not marked in the input language.

Regarding the SPD, Bickerton claimed that, because children rarely (if ever) make the error of incorrectly attaching progressive morphology to stative verbs, they must already know the distinction between state and non-state (i.e., process), thus supporting hypothesis (2): Children do not have difficulty — i.e., do not make errors — in acquiring the distinction that is part of the bioprogram. Bickerton also noted that Turkish children at the early stages use the indirect past marker -miS and the direct past marker -DI to differentiate between static and dynamic events, violating the norms of adult grammar. This, Bickerton argued, provides further evidence in support of hypothesis (1).

Bickerton (1981, p. 163) thus suggests that the acquisitional patterns of tense-aspect morphology in these studies can only be explained by assuming an innate bioprogram. He admits that a bioprogram specification may not appear in child language in an explicit form, but argues that if there is some indication of a bioprogram at work, and if the phenomenon cannot be explained by other theories of acquisition, this should be a significant support for the bioprogram hypothesis.

### 3. Input distribution as explanation

In recent papers, Shirai (1994; Shirai & Andersen, 1995) has proposed an alternative account for the acquisitional patterns of tense-aspect morphology which Bickerton had earlier attributed to the bioprogram. The proposal is that the pattern of acquisition is primarily driven by the distribution of the tense-aspect morphology in the input, and by children’s initial process of category formation.

Bickerton (1981) evidently assumes that the distribution in the input has no significant consequences in the acquisitional patterns of tense-aspect morphology. In reviewing the acquisition of Italian (Antinucci & Miller, 1976), which shows that perfective past forms (referred to as ‘participials’) are only attached to ‘punctual’ (i.e., telic) verbs, and imperfective past forms only to activity verbs, Bickerton (1981, p. 174) suggests that in child Italian participials (i.e., perfective past) and imperfects (i.e., imperfective past) are in complementary distribution, the first being used for punctual verbs, the second for nonpunctual ones. He, then, notes:

Note that this does not reflect anything in Italian grammar; all Italian verbs, whether punctual or non-punctual, activity or change-of-state verbs, have both perfective and imperfective past tenses.

But while it may be possible to attach per-
fective or imperfective past forms to any verb types, not all verb classes are evenly attached to perfective and imperfective past forms in real-life language use. There are natural relationships between perfective past and telic verbs (Bickerton’s punctual verbs) on the one hand, and between imperfective past and atelic verbs (Bickerton’s nonpunctual verbs), on the other. Leone (1990), cited in Andersen (1993), quantitatively establishes this association: in an adult-adult native speech sample (an interview), perfective past forms are predominantly attached to telic verbs (see Table 1).

Particularly revealing is the almost exclusive use of perfective past forms for telic verbs (i.e., Bickerton’s punctual verbs). Note that this comes from adult-adult discourse, which generally shows less skewing in the direction congruent with the tendency observed by Bickerton (Stephany, 1981; see Shirai, 1991 and Andersen & Shirai, 1996 for a comprehensive review of the issue of distributional bias in the input in the use of tense-aspect morphology). If such distributional bias is present in the input, it is not surprising that children follow this trend in acquiring tense-aspect morphology. Shirai’s (1991) study, subsequently published as Shirai (1994) and Shirai & Andersen (1995), tested this hypothesis by investigating the use of verbal morphology by three children and their mothers: Adam and Eve (Brown, 1973) and Naomi (Sachs, 1983) from the CHILDES database, MacWhinney, 1995).

Shirai & Andersen (1995) report that children’s early past marking is predominantly restricted to achievement verbs. This supports one of the predictions of Bickerton’s bioprogram hypothesis. At the earliest, emergent stage of past tense verbs, most of the past inflections are attached to achievement verbs (i.e., [+punctual], [+telic]). In the acquisition of English verbs, children use the bare stem as the all-purpose verbal form at the earliest stage (Brown, 1973). Then gradually they begin to attach verbal morphology on selective verb forms. What happens here is underextension of past morphology; children rarely overextend past tense morphology to semantically inappropriate contexts (Brown, 1973; Kuczaj, 1976). Then gradually children extend the application of past tense morphology to contexts that deviate from this initial verb class — i.e., they attach past morphology to atelic (Bickerton’s non-punctual) verbs, thus approximating the adult norm. Bickerton would argue that this

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4) Although Shirai’s study is wider in scope, in this paper I will focus on how it addressed the issues concerning Bickerton’s Language Bioprogram Hypothesis.

5) Children’s earliest use of past morphology is also associated with situations with clear end results, although this will not be discussed to simplify the discussion. See Shirai & Andersen (1995) for details.
Table 2  Distribution of past tense morphology and inherent aspect in children’s and mothers’ speech at the earliest stage (percentage based on token count)

<table>
<thead>
<tr>
<th></th>
<th>state</th>
<th>activity</th>
<th>accomplishment</th>
<th>achievement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>98</td>
</tr>
<tr>
<td>Mothers</td>
<td>17</td>
<td>10</td>
<td>13</td>
<td>60</td>
</tr>
</tbody>
</table>

provides further support for the bioprogram hypothesis.

At the same time, however, Shirai & Andersen (1995) also found that the caretakers’ past marking is likewise skewed in a direction congruent with the children’s nearly absolute trend: approximately 60% of past-tense markers in the caretakers’ input occurred with punctual verbs. It may have been this high correlation of punctuality with past morphology that resulted in the near absolute tendency observed in the children’s output (see Table 2, adapted from Shirai, 1991):

Let us now turn to the acquisition of progressive marking, which concerns both the PNPD and the SPD. First, Bickerton (1981) claims that children acquiring English first mark non-punctuality (i.e., imperfective) using -ing, and then later mark punctuality (i.e., telicity) by using irregular past. Shirai & Andersen (1995) show that the earliest use of progressive marking by the three children is predominantly on activity verbs, which is in line with Bickerton’s claim that children acquiring English mark nonpunctuality (i.e., lack of telicity) by -ing. This again, however, can be attributed to input: Approximately 60% of the mothers’ uses of progressive are with activity verbs (Shirai & Andersen, 1995).

Regarding the SPD, Bickerton’s prediction is that children will not make the error of incorrectly attaching progressive marking to stative verbs; this is because children know in advance the distinction between states and non-states (i.e., what Bickerton calls processes). Shirai (1994), however, shows that children do incorrectly attach progressive marking to stative verbs. It was found that one of the three children studied (Naomi) used progressive marking with state verbs, and some of the uses were obviously ungrammatical from the adult’s point of view (e.g., *seeing light, *needing). The study further shows that the pattern of error is guided by parental input: the child who made frequent errors of this type (Naomi) was exposed to maternal speech in which the ratio of progressive used with stative verbs (a usage that is not necessarily ungrammatical; see Smith, 1983) is higher than observed in the speech of the caretakers of the other two children in the study. In fact, the other two mothers never used progressive with stative verbs in the samples analyzed.

One additional piece of evidence for Bickerton’s SPD is the acquisition of Turkish. As noted briefly above, there are two past tense

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6) Although Bickerton (1981) claims that children acquiring English mark punctuality with irregular past, based on the observation (e.g., Brown, 1973) that regular past attains 90% suppliance in obligatory context, there is no evidence that only irregular past is associated with past marking. Both regular and irregular past emerge around the same time, although children normally attain 90% criterion for irregular past earlier, which can be attributed to higher frequency of irregular verbs in comparison to regular verbs in general.
markers in Turkish, one for direct experiences (-DI), and the other for indirect experiences (-mIs). According to Bickerton (1981), who cites Slobin & Aksu (1980), Turkish children at early stages use -mIs and -DI to differentiate between static and dynamic events because the distinction is innately programmed. He argues that evidentiality is not part of the bioprogram, and therefore Turkish children misinterpret this direct vs. indirect past as the grammatical marking to make the state-process distinction.

Aksu-Koç (1988), however, suggests an alternative, input-based account for this phenomenon, although she does not mention Bickerton’s SPD. She states:

The alternative route whereby the -mIs particle acquires the function of indicating stativity in children’s speech can be hypothesized on the basis of a significant feature of babyltalk in Turkish. Although it is not an independently established fact, it is a strongly shared observation that adults talk to infants and young children in the evidential with -mIs. That is they are likely to comment on existing states or on resultant states that have come about in the child’s presence as well as otherwise, with the -mIs particle, seemingly violating their own rules (p. 56)\(^7\).

If adults use -mIs for states, disregarding their own norm, it is not surprising that children mistake -mIs for a marker of stativity without any bioprogram. It would be interesting to investigate the distributional bias of -mIs in referring to states in motherese.

In sum, the evidence from language acquisition that Bickerton discussed to support his bioprogram hypothesis can be accounted for by input-based learning. The strong initial correlation between punctual/telic verbs and past marking, and that between progressive/imperfective marking and atelic verbs, which Bickerton interpreted as children’s bioprogram-based marking of the punctual-nonpunctual distinction, can instead be attributed to the skewed distribution in the input. The lack of overextension of stative verbs, which supports Bickerton’s state-process hypothesis, was not observed in Shirai (1994), and incorrect use of stative progressive was attributed to input. Initial use of two past tense forms in Turkish, which Bickerton argued are used to make the state-process distinction, was here argued also to result from the pattern of input. In the next section, a possible mechanism behind such a learning pattern is discussed.

4. Distributional learning and prototype-based initial representations

Although the importance of input and particular organizations of target linguistic structures for acquisition studies has been stressed by many researchers (e.g., Bowerman, 1985; Ochs, 1985; Clancy, 1989; Lieben, 1994), the actual analysis of how input con-

\(^7\) As Aksu-Koç (1988) points out, this phenomenon by itself is very interesting. She explains that -mIs is used to refer to “situation new for unprepared mind” (p. 56) because adults regard young children as not prepared for all kinds of situations. For further implications of such use of Turkish evidentials, see Akatsuka (1985), and Kamio (1990, pp. 209–225).
tributes to the initial representation of linguistic forms has not been systematically attempted. Budwig (1996, p. 143) notes that although language acquisition research has shown that children link the use of particular linguistic forms with particular meanings/functions in ways not necessarily identical with the adult model, little investigation has been undertaken regarding the basis for such linkage.

Budwig's studies are particularly relevant to the present discussion in that she started out from the constructivist position that children will associate particular linguistic forms with some conceptual units that are cognitively salient (Budwig, 1986, 1989). It was indeed found that 3 of the 6 children she studied associated the first person nominative pronoun I with low agentivity and control, while associating the genitive my and accusative me with high agentivity and control. More specifically, these children used my/me in situations where they act as prototypical agent, often by attempting to use language to bring about change (i.e., to control the situation around the child), as in Me open that. On the other hand, I was often used with stative verbs, which are low in agentivity and control, in that stative verbs normally do not refer to agentive actions. Budwig (1989) suggested that these children are marking agentivity and control, which are closely related to the linguistic notion of transitivity (Hopper & Thompson, 1980), by using distinct forms, disregarding the adult model (see also Clahsen, 1986, in which German children mark low transitivity by the -t inflection on the verb). This is in line with Slobin's (1985) Basic Child Grammar, which suggests children use specific linguistic forms to mark a scene involving prototypical agents.

Budwig (1996), however, investigated the input to these three children, and found that 59% of caretakers' uses of I involved a state verb, such as I like..., I think.... Also, 61% of their use of I functioned as non-control acts. This means that there was a high correlation of stativity, which is low in agentivity and control, with the caretakers' use of I. Thus, Budwig suggests that the input distribution may be the source of children's acquisitional pattern.

The interesting convergence of figures between Shirai's and Budwig's studies — 60% — is suggestive. Shirai's study also suggests the possibility that when 60% of a particular linguistic form is associated with one particular meaning/function, then children may associate it as if the association is absolute; about 60% of past tense morphology and progressive morphology was used with achievement ([+punctual, +telic]) and with activity ([+dynamic, -telic]), respectively, in the mothers' speech, and children initially restricted these morphological markings to those types of verbs almost exclusively.

The mechanism behind this input-driven early restriction is probably that of distri-

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8) This distribution is surprising in view of the low frequency of state verbs in child-directed speech generally (and possibly in adult-adult speech as well); only about 35-38% of all verbs used by three mothers in mother-child interaction were statives (Shirai, 1991).

9) Slobin himself has also changed his position regarding Basic Child Grammar, and now doubts that there are any special notions that are universally grammaticizable (Slobin, in press-a, in press-b).
butional analysis and prototype formation (see Shirai & Andersen, 1995; Andersen & Shirai, 1996). Children are not just passively imitating what caretakers say. They actively reorganize their linguistic representations based on the distributional information in the input, and create the initial prototype. In the case of tense-aspect morphology, children appear to be guided by inherent aspectual features such as telicity and punctuality in creating the initial prototype, while in the case of Budwig’s pronominal case acquisition, the three children are guided by the notion of agentivity and control. When the initial prototype does not coincide with the adult model, it results in underextension (past, -ing, and I), and/or overextension (My/me)\textsuperscript{11}.

If we assume this type of learning mechanism on the part of children, we do not need to posit an innate bioprogram to explain the pattern of past tense acquisition in Bronckart & Sinclair (1973) and Antinucci & Miller (1976), which Bickerton used as supporting evidence for his bioprogram hypothesis.

\textsuperscript{10} It should be noted that in the case of Italian, perfective past is used with telic verbs more than 95% in adult speech, which surely would contribute to the initial restriction of perfective past to telic verbs by children in Antinucci & Miller (1976).

\textsuperscript{11} There are many studies that have investigated how prototypes of natural and artificial categories are formed, which have shown that people form prototypes based on the exemplars they encounter (e.g. Posner, 1969), although the frequency alone cannot determine the prototype formation (Rosc, Simpson, & Miller, 1976). However, the study of how prototypes of polysemous linguistic forms are acquired is virtually non-existent, and is an area that needs investigation (but see Johnson, in press). In fact, there is no explicit theory on the process of prototype formation in our acquisition of linguistic categories (see Fukaya & Tanaka, 1996, Ch. 3).

The lack (or presence) of stative progressive (i.e., progressive marking used with state verbs) can also be accounted for by distributional analysis and prototype formation. As noted above, the English progressive shows the case of underextension at the early stages, and therefore overextension of ANY type is rare. Furthermore, stative progressive was non-existent\textsuperscript{12} in the speech of two mothers, which would give their children no association between -ing and stative verbs. The child (Naomi) whose mother frequently used progressive with stative verbs likewise produced stative progressives, including incorrect use (i.e., overextension). It appears that the prototype scenario accounts for the observed data very well.

One caution needs to be given regarding the universality of the initial prototype created through distributional learning: the initial prototype may differ depending on various factors, such as input frequency, learner characteristics, and the nature of the linguistic category to be acquired. Let us consider learner characteristics, or individual differences. Three other children in Budwig’s study did not show any association of I with low agentivity/control and of my/me with high agentivity/control even though the caretakers’ speech to all six children had a similar distributional bias with regard to the relationship between first person pronoun use and agentivity/control. Shirai (1993, 1996) investigated Japanese tense-aspect acquisi-

\textsuperscript{12} Stative progressives do occur in adult-adult speech. Robison (1995) reports 5.4% (22 out of 407) of the progressive forms used in his data sample (adult native speech in English) were stative progressives.
tion, and some children showed association of the -te i- form (durative aspect marker which mainly refers to progressive and resultative situations) with activity at the earliest stages, but there was also a child who showed no preference for activity verbs. This child, when he started using -te i- in the nonpast form (i.e., -te i-ru), also used it in the past tense form -te i-ta, which appears much later than the present form in other children. The child also used it with verbs of various inherent aspectual value. This child can be regarded as a conservative learner (at least in this particular linguistic domain) and therefore did not produce this form until he was comfortable with it. This kind of conservatism may result in linguistic behavior that are comparable to adult model right from the beginning. (It is therefore possible that three of the children in Budwig study who did not show any semantic/functional bias may have been conservative in this particular linguistic domain.) In any event, given all these factors, it is not realistic to predict that all children will go through the same prototype formation.

5. Conclusion

Finally, Bickerton’s argument from creole genesis needs to be addressed. His main arguments are that creole languages, which are created in a linguistic vacuum, have a lot in common with each other even though they are genetically unrelated. He claims this as important support for his bioprogram hypothesis. As it relates to tense-aspect-modality, creoles have anterior tense markers, non-punctual (imperfective) markers, and irrealis markers (which denote that the situation referred to is non-factual) in common. Givón (1982), however, offers a plausible explanation based on the communicative functions of these markers. Anterior reference, non-punctual situation, and irrealis are all ‘marked’ in narratives, and speakers simply need to give linguistic marking to show their special status in the flow of discourse, to get the attention of the listener. This is how these markers have come to be grammaticized in creoles, Givón argues. In fact, Bickerton (1981, pp. 282–286) also gives a similar account which attributes this phenomenon to our ability to make important distinctions such as that between foreground and background, between observable events and unobservable events, and so forth; the difference between Givón and Bickerton is that one attributes it to children’s capacity to create a system of efficient communication (Givón), while the other attributes it to pre-wiring, claiming that it is encoded in our genes through our evolutionary process (Bickerton). The point that needs to be stressed is that Givón’s functional argument is a good alternative account to Bickerton’s bioprogram account for creole genesis.

The main purpose of this paper has been to present an alternative account to Bickerton’s Language Bioprogram Hypothesis in the domain of tense-aspect acquisition. It should be pointed out here that the question of “innatenessor not” cannot be resolved by this account. In fact, the account presented here by no means disproves the Language Bioprogram Hypothesis proposed by Bickerton (1981) as an explanation of the acquisition of
tense-aspect markers, since Bickerton himself assumes there is interaction between the bioprogram and the target language structure, and does not predict that the effects of the bioprogram will always appear in the course of acquisition (p. 162). All I can claim here is that I presented supporting evidence for the claim that the acquisitional pattern is driven by input, not by innateness. This in fact is a dilemma for all empirical studies addressing the innateness issue; it is extremely difficult to determine what is innately driven and what is environmentally driven.

Still, I deem it necessary to look for an alternative explanation to the innateness account. An alternative explanation to Bickerton's bioprogram hypothesis is particularly of importance because one of the counterarguments used by Bickerton (1984b) against the criticisms by Bates (1984) is that there is no good alternative explanation for the phenomena he claims to be the result of an innate bioprogram.

When some phenomenon in language acquisition is not easily explained by an existing body of research, one way to explain it is by resorting to innateness — pre-wiring in the brain. Givón (1982) and others claim that such an approach is not good for research, as it "does nothing to advance their investigation, it simply defers it" (p. 156). My position is not so negative since strongly stated hypotheses often stimulate research\(^\text{13}\). However, Givón has a point in that if we are satisfied with the innateness explanation for the acquisition of a particular domain, we tend not to investigate into other possible sources, such as input, as done in the studies reviewed in this paper (Shirai, Budwig, and others).

What needs to be stressed is that we should not resort to innateness unless it is absolutely necessary. If we simply resort to an innateness account and give up trying to explain acquisition phenomena by environmental factors, we lose a chance of coming up with an alternative explanation, even in cases where further research might reveal that there is an alternative explanation. If innateness accounts are accepted without challenge, information needed to give informed judgments will not be obtained.

Finally, it should be noted that innate factors and input factors may both contribute to particular acquisitional patterns. For example, it is possible that both innate factors and input factors are at work in directing children in a certain direction in their initial acquisition stage. In fact, it is possible that input distribution can result in specific initial representation such as those discussed in the present paper (first person pronoun and tense-aspect) if and only if there are both conducive input distribution and innate predisposition. For example, even if there is bias in the input frequency that may foster such an initial prototype formation, it may not result in bias in children's language unless it is a universally grammaticizable notion (such as telicity, punctuality, transitivity). Although we should employ the simplest explanation possible for the sake of parsimony, we should also be realistic and allow for the possibil-
ity that acquisition proceeds as a result of confluence of multiple cues (Berman, 1994). Language acquisition is driven by the interaction of various factors, after all.

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