

mastered early, then switch on your grammar-acquisition device. We have some preliminary evidence that children recognize echo questions as having distinct discourse requirements at least by age 3 (Takahashi 1991), but it is hard to imagine this as instantaneous. Hence the scavenger hunt solution faces some difficulties.

The claim that syntax acquisition is instantaneous "once the lexical items and sentence structures" are fixed, hides most of what is interesting about acquisition. Crain means that the principles of syntax (subjacency, structure dependence, binding principles, the ECP) can only come into play once the basic phrase structure and lexical items are known. So any disobedience of those principles should be attributed to a failure of either lexical or phrase structure knowledge, and that is the traditional solution (Matthei 1981; Otsu 1981). The problem arises in assessing obedience to principles and grammatical structures independently.

Everyone admits that elicited production is a marvelous technique for increasing the frequency of rare sentences. But production often leaves us uncertain about the grammar generating the sentences in question. For instance, I have recently made the argument that children's first adjunct questions may be generated in the topic position in front of the sentence, masquerading as Wh-questions in the spec of CP (de Villier 1990). Researchers on German are deeply divided about the position into which German-speaking children place their verbs, even though they obey the "V2" rule of German (Meisel & Muller 1990; Weissenborn 1990).

In short, the manifestation of an appropriate surface form by a child does not guarantee that the grammar behind it is the same as an adult's. In particular, production studies do not tell us anything about excluded interpretations, so they must be supplemented both with interpretation experiments and, even more ideally, a comprehensive sample of the child's spontaneous speech at that same point in time. In practice, then, the criterion, "when all the lexical items and sentence structures are in place," is the cornerstone of all empirical work in acquisition.

Finally, it is worth pointing out that the errors that occur in interpretation are not just artifacts of poor experimental controls in every case. Consider the error we find that 4-year-olds make in interpreting a complex question such as: When did he say who he painted? Here, these children answer the medial, indirect, "who." Several controls have convinced us that this is not a simple parsing mistake, of the trivial kind ("answer the last Wh-word you hear" (de Villiers & Roeper 1991). Instead, it appears to reflect an option found in some other languages, in which the first question word is a scope marker for the second (McDaniel 1989). The fact is that children's grammars often deviate from adult grammars in extremely interesting ways, yet they may still be constrained by universal grammar – that is, somewhere, the child's grammar is right! The real stimulus for theory and understanding of the process of acquisition is not children's success, but their deviations from the adult state.

Noninnatist alternatives to the negative evidence hypothesis

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In this commentary we consider three issues. First, we suggest that Crain's definition of innateness is not biologically plausible. Second, we show how the criteria he uses as hallmarks of innateness can have alternative explanations. Finally, we reinterpret his research findings on grounds that do not involve innatist explanations.

What is innateness? Most students of language acquisition, including Crain, seem to equate innate with "unlearned," although few state this as an explicit definition (Oyama 1990).

Contrasting innateness and learning shows a confusion between different levels of biological organization. Learning presumably takes place in the realm of cognition and action, in which the brain participates through auditory sensation and speech motor processes to respond to, and to form, words and sentences. The genes, on the other hand, construct proteins within the nuclei of cells; they do not process speech input or regulate output. A fundamental assumption of innatist theories of language is that the structure of the brain and its related sensory and effector systems is just a bigger, better version of the genetic code.

Another reason why "unlearned" is not a legitimate definition of innate is that there are many types of environmental effects other than learning that alter developmental trajectories. Indeed, the genetic material cannot survive and reproduce outside its intracellular environment. The environment of the genes is physical, electrical, and chemical; learning is unrelated to it. The phenotype that results from those genes – as we know from an increasing number of studies in developmental biology, embryology, and teratology – is determined by a complex network of parallel and serial processes interacting in the intra- and extracellular environment. The structure of the brain is not a direct cellular instantiation of the genetic code, but rather the result of many dynamic processes including cell growth, migration, and synaptic generation and degeneration.

Problems with the "negative evidence" argument. Crain's claim that language is innate rests on the argument that the child lacks the necessary negative evidence about the grammaticality of utterances, that is, parental speech to children is inadequate to allow learning to occur. In this view the neuromotor system supporting language reflects the genetic component, whereas parental speech is considered to be the primary form of experience. We have already suggested that the neuromotor system is not innate, but rather the result of a developmental process, beginning at conception, that involves gene-environment transactions. To assume that parental speech is the only form of input to the neuromotor system supporting language is to ignore completely the large body of work on the prelinguistic development of speech and gesture. What emerges from that work (Dent 1990; Fogel & Thelen 1987) is that the patterning of social interaction has a sequential structure and a pragmatic ecology that constrains the timing, sequence, and semantics of speech in nonlinguistic ways.

For example, intonational information in child-directed speech can provide important cues to meaning and structure. Such "nonlinguistic" information might provide negative evidence of the sort that is critical to Crain's argument. As we show, some such information may be contemporaneously available in Crain's experimental tasks: Children could succeed in Crain's experiments without an abstract grammar of the sort that Crain suggests. Because of space limitation, we discuss only some of the experiments.

Alternative explanations of Crain's data. Consider Crain's complex protocol for subject extraction. As part of the task statement, the experimenter says to the child: "One of them gets to take a walk, one gets to take a nap." It is likely that in each of the "gets to" phrases in the task statement, both "gets" and "to" are clearly enunciated and distinguishable. Since the construction "gets to" is exactly parallel to the expected "wants to" (and not "wanna") response from the child, the child need not previously acquire this construction, but may simply copy the intonation contour, inserting the new word.

Similarly, the "protocols for rightward contraction" seem likely to be influenced by intonational and pausal differences. In ordinary speech, there are differences in "what that is" between (1) and (2):

- (1) Ask Ratty what that is doing up there.
- (2) Ask Ratty if he knows what that is up there.

The "is" is more emphatic and distinctive in (2) than in (1). This is exactly the kind of information available to the child that could allow repetition without contraction in (2).

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Next, consider the “1 clause crossover task.” In (3), as the last-mentioned characters in the story, Robocop and Batman might most naturally be the referents for “they.”

(3) I know who they scratched. Bert and Huckleberry Hound.

Because Bert and Huckleberry Hound follow scratched, the child can readily connect these as the objects of scratching, particularly since “they” is already determined. Presumably the child has some minimal knowledge of the subject-verb-object structure of English. The child’s knowledge of reflexive pronouns might also provide a correct interpretation. Suppose a child already has some experience with sentences involving the reflexive, such as (4), and therefore can reject (3) as reflexive.

(4) I know who scratched themselves. Bert and Huckleberry Hound.

In other tasks, there are semantic or pragmatic facts available to the child so that there is no need to appeal to innate syntactic structures. Crain argues that multiple modifiers have a hierarchical rather than a flat structure as a result of innate syntactic rules. But this hierarchical structure seems grounded in semantics and based on the child’s experience with objects. Some features of objects are relatively intrinsic (Garner 1974); in Crain’s task, these are shape and stripedness/plainness. Other features, such as relative position in an array, are extrinsic. The intrinsic-extrinsic dimension provides hierarchical structure. The child’s knowledge of the intrinsic properties of the objects in the task is presumably established (or heightened) by experience with the objects, exactly in accord with Crain’s procedure.

Similarly, one could argue as to the semantic/pragmatic origins of relativization in the child’s experience with given and new information. Consider (5), uttered by a child who did not yet produce relative constructions:

(5) It’s a fishing pole, and you fish with it. (from High et al., unpublished)

Does the hierarchical relation expressed here emerge from an innate relative structure not yet realized syntactically, or has the child simply expressed a relationship acquired from prior experience, a relationship grounded in pragmatics rather than in syntax?