Patterns in the mind

Language and human nature

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For Amy and Beth

10 Language acquisition in unusual circumstances II

Creation of language: Home Sign

In Chapter 8, we saw that children acquiring language produce utterances that are different from those they hear in the environment. They can create plurals for nouns they have never heard before ("wugs"), regular past tenses for irregular past tense verbs ("holded"), and nonstandard constructions for negative sentences ("Daddy not come home"). Such errors are important because they show that the child isn't just imitating the input, but is rather constructing *rules* of mental grammar. These particular rules don't happen to be exactly the ones employed by the adults in the environment—they can be regarded as a good first or second guess, to be revised in the light of further experience. They help us to see how much the learning of language is an act of construction for the child, not just a passive "soaking up" of data from the environment.

This section and the next deal with cases in which children construct rules in response to environmental input, *despite the fact that the environmental input is not systematically rule-governed.* The children actually end up *creating* a new grammar where there wasn't one (or much of one) in the adult models. These cases demonstrate dramatically that children are relentless grammar-constructors. They can't help but interpret language-like input as though it is a language, structured according to the dictates of Universal Grammar.

For the first case, let's return once again to deaf children. Remember that most deaf children are born to hearing parents, who may not even know there is such a thing as sign language. Sometimes the parents may begin to learn a little Manual English to use with their child. As we saw in Chapter 7, Manual English just follows English word order, complete with prefixes and suffixes. But it turns out that young children exposed only to Manual English often spontaneously improvise some of the distinctive grammatical characteristics of ASL and other sign languages. For instance, they may

modify the motion of a verb to indicate manner or speed of motion (which seems fairly natural), and they may even use spatial location in signing space to pick out different characters (which seems a bit more surprising). In a sense, the children instinctively reject the organization of Manual English as an appropriate grammar for a signed language, substituting something more in line with the natural proclivities of the signed modality.

Even more interesting are ten children who were studied intensively over several years of their development by Susan Goldin-Meadow and associates. These children, profoundly deaf at birth, were born to hearing parents and exposed to no sign language at all. Nevertheless, each of them invented a substantial system of signs with which to communicate with the parents. These "home sign" systems reveal some interesting aspects of the language acquisition process.

How could Goldin-Meadow tell that these children were using a *language* of sorts and not just random gestures? After all, each one invented something different. But there were characteristics in common. First of all, there was clearly an attempt at communication. The children didn't just stand around gesturing: they made a point of establishing eye contact with an addressee before performing the signs. Second, their gestures weren't performed on objects. For instance, the gesture signifying the opening of a jar would be made in the air, not on the jar. Third, the gestures came in strings separated by relaxation of the hand, just like sentences of sign language. Fourth, it was possible to read a meaning into the gestures—to guess consistently what the child had in mind.

Goldin-Meadow was able to separate the children's gestures into a number of types, of which I want to mention two. The children used *pointing* gestures predominantly to pick out objects, people, and places in the environment. They also used stylized pantomimes of actions, to characterize either an action itself or an object that characteristically performs that action (such as a bird, denoted by two hands flapping). Goldin-Meadow called such gestures *characterizing* gestures.

Interestingly, the children sometimes used pointing gestures to "point" to things not present in the environment. For instance, one child pointed to an empty jar, then gave the gesture for "blow," in order to request that an absent jar full of bubble liquid be produced. Another child used a "round" gesture to signify a Christmas tree ball, then pointed to a place on the imaginary object to refer to the little hook on top of the ornament. These examples, which are typical of what was found in "home sign," go beyond the usual here-and-now

function of pointing. In one case studied in detail, the child started using pointing gestures to indicate absent objects shortly after age three, and started pointing at features of imaginary objects shortly before age five. Guess what: children exposed to ASL start using pointing gestures in these ways at just about the same ages. This hardly seems like a coincidence.

What made the children's behavior especially language-like is that they strung gestures together into longer utterances. And here again their development parallels normal language acquisition. Goldin-Meadow happened to start observing two of the children at a stage when they produced only one sign at a time. They began producing two-gesture strings at ages one and a half and two and a half, both well within the range for the onset of the two-word stage in normal language acquisition. Similarly, during the study, four children progressed from a two-gesture stage to production of more complex utterances. Three of them were between two and two and a half; the third was about three and a half. Again these fall in the normal range for progression from the two-word stage to more complex language.

Let's see what kind of language the children eventually arrived at. In fact none of them went much further than the two-gesture stage. Like the two-word stage of normal acquisition, their utterances left a lot out. For instance, the act of X giving Y to Z might be signed by "X – Z," "Y – give," "give – Z," or "Y – Z," that is, just about any combination of two of the relevant four signs. However, as in the two-word stage of spoken language, the signs appeared in fairly consistent order. For instance, the sign for "give" tended to appear after the thing given but before the person doing the receiving: "Y – give" and "give – Z", but not the other way around.

When the children did create more complex sentences, they tended to express multiple actions as in (1a), multiple actors as in (1b), and multiple events without shared characters, as in (1c).

(1) a climb - sleep - point [to horse]
   "The horse climbed and then slept."
   b point [to pear] - point [to banana] - no - roll
   "The pear but not the banana should roll forward."
   c sip - point [to toy cowboy] - point [to toy soldier] - beat
   "The cowboy sips a straw and the soldier beats a drum."

In the case of one child who was studied especially carefully, it actually proved possible to classify his signs as nouns, verbs, and adjectives, where each part of speech had its own particular grammatical properties. For instance, his verbs developed an analytic treatment in terms of handshape and location, paralleling the grammatical structure of the ASL verb. Like deaf children exposed to Manual English, he invented a spatial inflection of action signs, displacing them toward the position in signing space occupied by the object in motion. This systematicity began to appear between three and three and a half, comparable to the age at which children learning English start using plural and past tense systematically. (By the way, it is not as though the other children didn't have such structure too; it is just that discovering it is extremely labor-intensive, given that each child is different and there is no translator to help out.)

On the other hand, even by the age of nearly six, none of the children developed recursive structures parallel to "Bill said that Harry thought Sue was a genius." Nor did they develop abstract connectives like "if," "before," or "because"; and generally their utterances never got longer than four or five gestures. This contrasts with children learning language in normal circumstances, who by the age of five are chattering away in complex sentences full of recursion and abstraction.

Still, the fact that the children got this far is fairly amazing if we look at the sort of input they got. To be sure, their mothers gestured, using both pointing and characterizing (pantomimic) gestures. But the mothers had far smaller vocabularies of characterizing gestures, overlapping no more than 33 percent with the vocabularies of their children. Yes, the mothers did produce strings of gestures—but far less frequently than their children. The children were fairly reliable in the order of their gestures, but the mothers were not. And when children began producing complex utterances like those cited above, it was not as a result of modeling their mothers: the mothers started doing it *later* than their children. As for the child whose signs were shown to have internal structure, his mother's signs were found to have a far less systematic analysis. In short, *the children had a much more elaborate and consistent mental grammar than their mothers.*

These children illustrate all the more vividly a point I was making in Chapter 3. Children can't get rules of mental grammar from the environment—the most they can get is *examples* of utterances, from which they construct their own mental grammar. In these cases, the parents provide lots of gestures, but the structuring of

these gestures in rule-governed fashion can't come from anywhere but the children themselves.

In order to explain the invention of these systems of home sign, we have to suppose that children are looking for something—anything—in the environment that looks remotely like language, something out of which their Universal Grammar can construct a mental grammar. If the auditory–vocal channel doesn't provide any useful material (because the child is deaf), Universal Grammar seizes on the manual–visual channel as the only kind of input with enough richness in it. As a result, the mother's relatively unstructured gestures become the raw material out of which the child's Universal Grammar constructs a language—a rudimentary one, to be sure, but at least paralleling the normal linguistic achievements of a child up to the age of three or so.

One final angle. Not only do the mothers not teach the grammar to their children, they don't learn it from their children either. The disparities between the children's systematic use of gesture and the mothers' unsystematic use persist over two years and more of the study. The mothers just don't get any better. Why?

Goldin-Meadow observes that the mothers always use their gestures as accompaniment to speech. She suggests that gesture tied to speech does not itself have language-like properties. For instance, in the course of normal speech we tend to use only one characterizing (pantomimic) gesture per sentence. So perhaps the fact that they're speaking prevents the mothers from using (or from developing) use of sign as rich as their children's.

Another possibility is that the mothers are victims of the critical period. Although their children can't help interpreting gestures in the environment as a language, this interpretation is not open to the mothers: they're too old to acquire a second language. (I should stress, though, that both these explanations are just guesses at the moment. Maybe we'll know better in ten years.)

Creation of language: Creole

A very complicated and curious linguistic situation has occurred a number of times over the past three centuries. Hawaii provides a typical example. In the 1870s, a tremendous expansion of the sugar plantations brought an influx of laborers from China, Japan, Korea, the Philippines, Portugal, Puerto Rico, and elsewhere; by 1900 these laborers outnumbered other groups in Hawaii by a ratio of two to

one. At home, everyone spoke their own native language; but out in the community, it was necessary to communicate with speakers of all the languages present. The result was the development of a so-called *pidgin* language, a makeshift that served as the means of communication in multilingual situations.

By 1900 the pidgin in use in Hawaii was based mostly on English vocabulary—I'll give some examples in a moment. Elsewhere in the world, pidgins developed based on other languages, usually that of the predominant colonial power in the region. For instance, in certain areas of the Caribbean, the pidgin that developed was based on English; in other areas, on French; in yet others, on Spanish.

Hawaiian pidgin was in widespread use in the early 1900s, so in the early 1970s, the linguist Derek Bickerton (on whose work this section is based) was still able to interview and record surviving speakers of the language. Two features of pidgin are significant for our present purposes. First, pidgin is syntactically impoverished. It lacks functional vocabulary: there is no systematic use of articles, auxiliary verbs, or inflections. There are no subordinate clauses, and the verb is frequently omitted.

Second, the basic word order is extremely variable, depending to a great extent on the native language of the speaker. For instance, since Japanese puts the verb at the end of the sentence, pidgin speakers of Japanese ancestry produced sentences like (2). (To make this material relatively easy to interpret, I've chosen examples that don't contain non-English words, and I've transcribed the sentences with English spelling—a convenient oversimplification.)

(2) *a* too-much money me think catch though
  "I think he earns a lot of money, though"
 b the poor people all potato eat
  "The poor people ate only potatoes"

By contrast, the Filipino languages characteristically put the verb before the subject, so Filipino speakers of pidgin produced sentences like (3).

(3) *a* work hard this people
  "These people work hard"
 b more plenty the Ilocano than the Tagalog
  "Ilocanos were more numerous than Tagalogs."

Interesting as this is, I want to go on to what happened next. What did the children do who were born in Hawaii in this pidgin-speaking environment? How did they end up speaking? As it turns out, the

period from 1900 to 1920 saw the emergence of a new language, Hawaiian *Creole*, whose roots were in the pidgin, but which possessed its own grammatical properties. This language evidently developed as the response of children who grew up hearing pidgin spoken.

Let's see a little of what Hawaiian creole is like. In contrast to pidgin's extreme variability in word order, and its dependence on ethnic origin, creole is quite uniform from speaker to speaker in its basic word order: subject-verb-object. It never uses a word order with the verb at the end, like the pidgin sentences in (2). It sometimes uses a word order with the verb at the beginning, but only as a special option to highlight new information:

(4) no like play football, these guys
   "These guys, they don't like to play football."

The language permits complicated syntactic constructions, including various kinds of subordinate clauses. Bickerton contrasts pidgin and creole versions of identical sentences to illustrate the difference.

(5) *a* Pidgin:
   No, the men, ah–pau [finished] work–they go, make garden. Plant this, ah, cabbage, like that. Plant potato, like that. And then–all that one–all right, sit down. Make lilly bit story.
   b Creole:
   When work pau [is finished] da guys they stay go make [are going to make] garden for plant potato an' cabbage an' after little while they go sit down talk story ['shoot the breeze'].

Perhaps most interesting is that Hawaiian creole has a system of functional words, some of which can be seen in (5b). Some of these functional words have properties not found in any of the languages that contributed to pidgin. I'll give two cases.

First, the articles in creole are altogether consistent and meaningful. Where English uses the definite article "the," creole uses the equivalent "da." But where English uses the indefinite article "a," creole sometimes uses the equivalent "wan" (from "one"), and sometimes leaves it out. The choice isn't random or careless. "Wan" is always used when the speaker is referring to a specific item unknown to the listener, for example in (6).

(6) He get wan black book. That book no do any good.
   "He has a black book. That book doesn't do any good."

On the other hand, if there is no specific reference, "wan" is omitted, as in (7).

(7) But nobody gone get job.
   "But nobody will get a job."

Notice that in the English translation of (7) the speaker isn't referring to any particular job; this is why the creole sentence omits "wan." This difference between including or omitting the indefinite article is not present in English or any of the other parent languages of Hawaiian pidgin. It is, rather, an innovation in creole.

Another such case is found in the pair of sentences in (8). (Notice, by the way, that instead of the English past tense ending, creole uses the auxiliary verb "bin" to mark past time.)

(8) *a* John bin go Honolulu go see Mary.
   b John bin go Honolulu for see Mary.

These are both translated into English as "John went to Honolulu to see Mary." But it turns out that they are different in a way not expressed in English. If the speaker says (8a), we know that John actually saw Mary; if (8b), we know that he failed to see Mary. The English sentence, in contrast, leaves the outcome open. So here again is a consistent grammatical difference between Creole and English (as well as the other parent languages).

As usual, these examples are only the smallest sampling of a rich and detailed study. But they are enough to raise the basic issue: Where did this language come from? We don't know how it happens that a community ends up speaking a uniform language, but sure enough, over a period of twenty years or so, a language with full grammatical properties appeared where there wasn't one before. This language has basic word order and vocabulary mostly derived from English, but its detailed grammatical properties are not those of English or of any of the other parent languages.

Let's think of it in terms of acquisition. The children who grew up speaking creole did not have parents who spoke creole—rather, they heard the rudimentary and highly variable pidgin. These children ended up speaking something different from what their parents, or any other adults, spoke. So we have here a situation much like the creation of home sign, except this time multiplied over an entire speech community.

Creole, of course, is much more elaborate than home sign, which, as we saw, is much simpler than even pidgin. But of course the children hearing pidgin have three things the home sign children lack.

First, they have access to the well-developed vocabulary of pidgin, while home sign children have to invent practically everything. Second, the children hearing pidgin have each other—there is a developing community of speakers of the more elaborated language. Third, the children hearing pidgin are also learning their parents' native language, so there is another fully fledged language in the environment (although in most cases one that has little to do with the developing creole). We don't really know how such a situation results in a uniform language developing in the course of one generation. That remains a mystery for the moment.

Still, the facts are incontrovertible. In one generation, the children growing up in pidgin-speaking homes have constructed uniform mental grammars that allow them to construct sentences far more complex than they ever heard from their parents. There simply is no adult model that accounts for what the children end up learning. Moreover, these mental grammars have properties that have evidently come from nowhere in the environment. So where could they have come from? We have no choice but to fall back on Universal Grammar.

The plot thickens. Bickerton points out startling similarities among the creole languages of the world, features that have developed independently in one language after another, without contact among them and without models in parent languages. As a consequence, he claims that the grammar of creole *is* Universal Grammar (he uses the term "bioprogram"). The idea is that children growing up hearing pidgin have essentially no useful grammatical input, so they simply adopt the mental grammar that is prespecified genetically. He bolsters this claim by pointing out that many of the grammatical constructions in creoles are found in child language. For instance, the treatment of negation in Hawaiian creole is not so far off Stage 2 of the acquisition of English negation that we saw in Chapter 8.

(9) Creole: no like play football, these guys
Child language: I no want envelope

I don't think Bickerton's analysis is quite right here. Children exposed to English do eventually learn complex things like the English past tense, verbal auxiliaries, and negation. In Chapter 9 we examined learning by genetically impaired individuals and individuals past the critical period, and we found that these complex parts of language are just the ones that are most affected. We took this as evidence that one needs a learning capacity specialized for language

in order to acquire them. Yet, on Bickerton's hypothesis, any complex principles that aren't found in creoles do not fall under Universal Grammar.

Alternatively, suppose that we go back to the idea that UG provides the child not with a complete basic mental grammar, as Bickerton claims, but with a menu of options for mental grammar, out of which the child eventually has to choose an option that is maximally tuned to the environmental input. Suppose in addition that this menu is like a lot of computer software menus: it has "default options" that are chosen if you don't tell it anything special. Then the story would go like this: children exposed to pidgin hear nothing that tells them how to select options in the menu of UG. Instead of doing nothing, they select the default options, which give them a mental grammar for creole languages. In addition, when learning other languages, children will often try the default options first before trying to find a better approximation to the language in the environment; this behavior will result in some of the kinds of systematic errors we find in normal language acquisition.*

However this story works out in the end, the crucial point for our larger picture is that children are hearing pidgin *as though it is a fully formed language*—that is, they have imposed organization on the environment that goes well beyond the organization actually present in the adult utterances from which they learn. This is a striking refutation of the view that children learn by imitating what they hear and somehow "soaking up" language from the environment. Again, it is strong substantiation of the Argument for Innate Knowledge—that the child brings powerful internal resources to language learning.

It also, by the way, provides more evidence for the critical period: the adults who speak pidgin to their children end up still speaking pidgin—they never acquire creole. They are just too old to acquire all the complex grammatical properties that their children have invented!

Teaching language to apes

No discussion of language acquisition would be complete without mentioning the most famous experiments in language learning: the attempts to teach language to chimpanzees and gorillas. In the 1950s,

* For the moment, Bickerton and I have agreed to disagree on this issue, but on the larger picture we are certainly in accord.