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## Of Babies, Mothers, and Language

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Half a century ago, those of us studying child language, also known as psycholinguistics or developmental linguistics, got word of a deeply troubling discovery: a 20th-century feral child. A thirteen-year-old girl, shrouded in total silence, was found with her blind mother by her side in a welfare office. A social worker alerted the authorities, and this is how Genie, the feral child of California, took her place in the literature next to her infamous predecessor of the 18th century, the wolf-boy Victor of Aveyron. A victim of incredible neglect and abuse, Genie had spent her first years of life tied down, in a sparsely furnished bedroom of a house where the father had forbidden her mother and older brother to talk to the girl, the only noises reaching her coming from a partially open window. The child had been kept in that state since birth: no one spoke to her. Not surprisingly, when she was taken to the children's hospital, it was found that she could not speak.

A team of linguists from UCLA came to her aid, valiantly, teaching her language over the next several years. They found proof of what was widely circulating at the time in research circles: that beyond a certain age, coinciding with the onset of puberty, language cannot be acquired with the same level of success and in the same ways infants learn the natural language (or languages) they are exposed to from birth. The deficit was particularly noticeable in the area of syntax, or the stringing of words together into phrases and clauses. Given the stage of thinking about child language acquisition at the time, that represented further proof that we are born with a "device" which allows for a smooth, staged, rule-governed learning of syntax, which, if not put to use in the first years of life, atrophies, leading to an imperfect acquisition of syntax. Indeed, Genie has not acquired an adequate level of syntactic knowledge of English to this day, even though at the time she made rapid progress in learning vocabulary and quickly developed a sophisticated repertoire of non-verbal means of communication.

What struck me at the time and still troubles me is that Genie was deprived of the miraculous years children have before they start going to school, when, in the process of emotionally bonding with their parents, mostly mothers, and with their help, they figure out the basic outlines of their mother tongue: sounds and intonation, syntax and meaning. Without a doubt, language continues to develop after school age, mainly, though not exclusively, through

reading and writing, but the pace and amount of language learning never matches that initial, awe-inspiring burst.

How is language learned? Can great apes learn to use language? How about machines in the age of AI? From Washoe to Nim Chimpsky (humorously called so after the most influential linguist at the time, Noam Chomsky!) to Koko, the 1970s witnessed numerous experimental, almost desperate attempts to show that when it comes to language, there is no difference between children and apes, thus attempting to fill in a missing component of evolutionary theory. However, the most diligent programs of teaching apes a modified version of American Sign Language (ASL) did not take their subjects beyond random concatenations of two to three signs, after excessive prompting and a generous reward system. ASL is a full-fledged grammatical language; what the apes produced and understood at the height of the studies and the top of their language capabilities was not that, but just elements of a protosyntax that stopped there. As Chomsky chimed in, if the apes could learn language, they would learn it in the wild.

Now, fifty years later, the same major efforts are underway towards equipping machines with the ability to understand and produce human language. Deep-learning AI, at the basis of machine assistants, machine translation, and the like, involving pattern matching, requires huge amounts of language data—as well as culture-bound usage information and simple common sense—to produce and comprehend language. A philosopher trying to assuage people's fears of AI said that anxiety could be justified when and only when chatbots can carry out an interaction with all the twists and turns of a human conversation. For the time being, then, we can say with great confidence that language is purely and uniquely human and turn to the issue at hand: how children learn it.

What happens during the first five years of a child's life in the absence of any pathology? More recent research moves those wonder-filled years to the pre-natal months. Right after they are born, and without much face-to-face interaction through language, babies have been shown to recognize their mothers' voices. They appear to distinguish rhythmic patterns as early as 35 weeks of gestation, and at birth they even cry with intonations reflecting the language they heard prenatally (e.g., a rising intonation if they had heard French while in the womb, and a falling intonation if the language was German). There are those who state forcefully, with scientific evidence, that the pre-natal months are the most important period of development, with all five senses, memory, and learning working at least since the seventh month of gestation. The auditory system is definitely working before birth: the voice of the mother is heard most clearly, without any filter, while the voices outside the world of the baby, such as that of the father, are heard through the swishing amniotic fluid and the baby's strong heartbeat. All in all, the voice of the mother can be said to provide continuity between the pre-natal and natal worlds.

Let's add that soon after they are born, and with little exposure to language, babies recognize as familiar most of the sounds of the language addressed to them and are oblivious to unfamiliar sounds from another language. That, happening as it seems to before they produce any vocalizations, is certainly a head start!

And then the beautiful dance of mother-child conversational interaction starts. Mothers adapt their language to what they intuit as the appropriate level of the child, simplified language, but by no means simple: they modify their intonation, repeat short statements, leave short regular pauses after each turn, leaving space for the non-verbal infant's conversational contribution, sometimes they use diminutives and reduplicate syllables (“doggie-dog”); for instance,

M: You are a beautiful baby. (PAUSE)

M: Yes, you are. (PAUSE)

M: Yes, you are. (PAUSE)

M: You are my beautiful baby.

In other words, they do not mind sounding hilarious to some onlookers and endearingly naïve to others. They do it in the firm conviction that what they do is important work. They smile and cradle their babies and make sense out of muscle twitches that look like returned smiles, and lip configurations that look like attempts to articulate a word. And if and when the babies start cooing and babbling, by the middle of the first year, the nonsense syllables acquire sense in the mother-baby interaction, and conversational enthusiasm rises. Mothers do all this without any coaching, without consulting any YouTube videos or even pediatricians; they do it instinctually. It definitely helps that their interlocutors are irresistible: they closely and eagerly attend to the mothers' faces, blow bubbles and raspberries, and wet their diapers with excitement. They seem to know that the stream of sounds coming their way is worth paying close attention to, unlike the whirring of a refrigerator or any other environmental sound. Foundational rules that govern a culture's conversation, such as turn-taking (when a conversational turn is over and the conversational partner may jump in), as well as most of the sounds of the mother tongue, and the intonation that signals the difference between a question and a statement are thus acquired before the baby says any words. Genie didn't have any of that.

Where language acquisition is concerned, as well as affect and cognition, the first 18 months of a baby's life are invaluable. That's not enough though: the process cannot stop there, for if it does, this large amount of learning will dissipate. Then the first real decipherable words appear: American mothers, for instance, label objects in their shared environment, the "here and now," redundantly identifiable through gaze and gesture and word, and babies follow. With the rising intonation for a question and a falling one for a statement or exclamation, babies can now turn one word into a question or a statement of identification or a sign of victory: one word and three more "utterances" as conversational contributions. By 18 months, a baby can produce at least 50 words, mainly nouns and some verbs and adjectives, and understand three-four times more. By the age of five, the average child's production vocabulary is 2,000–4,000 words, and ten times more in comprehension.

The apex, though, is the beginning of syntax, when at least two words are strung together. For with incipient syntax, the conversations become more complex, and in the process, children's utterances become longer:

C: doggie

M: Doggie's gone.

C: doggie gone

M: Look doggie's in the yard.

C: look doggie yard.

In his *Phenomenology of the Human Person*, Robert Sokolowski elevates syntax to “the most tangible presence of reason and the most palpable presence of the human person.”<sup>11</sup> Syntax arises from the joint interaction between child and mother. Its complexity increases with time, so that by the time children go to school, they have under their belts, as it were, the basic grammar of their mother tongue.

Considering how difficult it is to learn a language as an adult—who will hardly ever attain native-like pronunciation and intonation and will be dogged by lingering syntactic challenges—what children accomplish in five short years is nothing short of a miracle. Even a double miracle if the child is exposed to two languages from birth—an invaluable gift that parents can give their children, one that has to be treasured and reinforced with literacy lest it be lost. Genie’s later language development was marked for the rest of her life by the absence of this miracle as the confluence of affective, cognitive, and linguistic conditions necessary for effortless language acquisition were not present in her first five years of life.

At the time when the 20th-century feral child was discovered, two major theoretical paradigms came head to head: Skinner’s “behaviorism” and Chomsky’s “generative-transformational grammar,” with its accompanying “innateness hypothesis.” Both made strong claims about how language is learned. In order to advance his theory, Chomsky had to demolish the prevailing behaviorist theory, with its claim that the child comes into the world a blank slate on which language is inscribed through stimuli, operant conditioning, and reinforcement—a theory that held sway in many learning environments. And demolish he did, without retort from its author. With Chomsky’s critique of behaviorism, the pendulum now swung in favor of the notion that, given the paucity and imperfection of the language stimulus, one needs to assume that a child is natively equipped with a sort of abstract set of language rules that take in the language the child is exposed to and fit it together gradually into a more adult-like shape. Chomsky’s early Language Acquisition Device was supposed to do just that. It was supposed to contain, at least in its early incarnation, the abstract syntax Chomsky developed for English. In effect, the pendulum had swung to the other extreme: away from a thoroughly empiricist behaviorism with its repetition and imitation in the here and now (à la the ape language experiments) to a nativism of innate abstract brain structures waiting to be activated by the language of exposure.

In the 1970s, so intense was the debate that, depending on where you stood, two words became taboo: “behavior,” redolent of Skinnerian operational conditioning and “tendency,” smacking of Chomskian innateness, of instinct. As a novel and intriguing way of looking at language learning, promoted aggressively in the academy, the new theory won out, and it lingers to this day in some form or another; many linguists subscribe to it, or at least to its most recent incarnation, which is not essentially different. Thousands of experiments assuming Chomsky’s innate universal grammar, controlling variables to the best of the researchers’ ability, and measuring bits and pieces of language were carried out during the subsequent decades; some tried hard to prove the theory, many could not prove it no matter how hard they tried. Behaviorism did not return as such, but in response to Chomsky’s grammar, with syntax at its heart, the focus in some linguistic circles switched to language in the context of usage, to socialization through language. At the same time, quite a few longitudinal studies were carried out by mothers-researchers, looking at day-to-day linguistic behavior, systematically, without many assumptions, trying to figure out how the process unfolds naturally. However, not even in mother-baby longitudinal studies could we hear the amazement of discovery. Instead of marveling at what they were uncovering by close observation, the researchers were more keen on inserting themselves into the theoretical model regnant at the time.

This is the pendulum movement of theories: as we all want universal, all-encompassing

explanations of human behavior, we produce sweeping, bold theories, only to be cut down to size by actual human behavior—diverse, quirky, delightful, unpredictable, at times magical. Today, few would go into the details of what is innate about language, nor would anyone deny some level of imitation and repetition in language acquisition. But the process of language acquisition cannot be constrained by a theory. Babies are more complex than that. It is not hard to see that the pendulum of the theoretical foundations of language acquisition is now somewhere in the middle, where it should be. For no one can deny that without exposure to language, children would not acquire language. Even cryptophasia, the interesting and still mysterious phenomenon of twins developing a secret language, or the development of creoles spontaneously arising from parents' simple pidgins, occurs on the margins of normal mother tongue acquisition. But "exposure" is qualitatively different from behaviorist stimulus. Similarly, without an inborn tendency to attend to communicative language and to test hypotheses about how language works and what the relationship between words and the world is, language will not be acquired or will be delayed considerably. But what is at work here is quite different from a language acquisition device.

Language is acquired and developed only when babies are exposed to communicative language, language that is addressed *to* them: not to overheard language, for Genie must have overheard some language in her captivity; nor to TV language, as in the case of a hearing baby of deaf parents who wanted to give their offspring the gift of vocal language. In order to acquire language, children have to be talked to by their mothers (and fathers and siblings and other adults), who have to take the time to interact with them face to face, to treat them as conversational partners; mother and baby have to attend jointly to their environment and talk about it. We have to give babies credit for coming into the world equipped for exactly this kind of activity and, under normal circumstances, eager to figure out language and put it to good use. Someone observed that babies are the only mammals who at birth lift their eyes with an intense gaze, interested and ready to learn.

It goes without saying that the language development process continues beyond the first five years, for after the acquisition of literacy, language and particularly vocabulary growth, but also more complex syntax (displayed in writing), have a second flourishing. What happens to language in the first five years, however, between mothers and babies is never replicated.

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<sup>[1]</sup> Robert Sokolowski, *Phenomenology of the Human Person* (Cambridge University Press, 2008), 39.

