An interview on linguistics

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Noam Chomsky interviewed by the British Broadcasting Corporation

QUESTION: Back in the fifties what led you to think about language in a different way than it had previously been thought of?

CHOMSKY: Well... the main change I guess was that at that time, I and others were involved in an effort to construct explicit grammars, that is explicit theories of a language which would describe systems of rules and principles which would characterise exactly the form and meaning of the sentences of a language. Now in a way that had been the goal for a long time but there had never been a way of achieving it because the techniques for giving an accurate account of an infinite array of complex data were not well understood. By the mid-twentieth century those techniques had become well understood through advances in the formal sciences and it became possible to undertake a project which had very traditional roots though it had been abandoned for a long time, namely actually characterising what used to be called the infinite use of finite means. The mind has finite means but it makes unbounded use of them and in very specific and organised ways. That's the core problem of language that it became possible to face.

As soon as you began to face it seriously, say in the mid-fifties, it became evident instantly that the most comprehensive grammars and detailed dictionaries didn't even begin to scratch the surface of the phenomena. They were basically presenting hints that were sufficient for someone who already had knowledge of the language, to be able to get further knowledge but they were pre-supposing a vast wealth of knowledge of language and the task was to address what was being pre-supposed in the huge, traditional, comprehensive grammars and in dictionaries. When that was done, it was found that the very delicate and precise and specific understanding was achieved under very slight access to information, which meant that the language system is like other biological systems. It develops in its own specific fashion on the basis of its genetically determined properties and in the course of this development it's modified and shaped by interaction with the outside environment in some fashion.

If you want to study the visual system you find the same thing: it reaches a highly articulated very specific form - but not without data. In fact, it is now known that if you prevent visual evidence from reaching the visual system at an early period of life this system actually degenerates. But through some interaction of the initial instructions, the genetic constructions and triggering and shaping events of the environment, an intricate system of a highly specific sort takes shape. Language seems to be pretty much the same way and from then on the task is just to separate out these factors to see what are the principles which are rooted in our nature and therefore will establish the form, the basic form of any human language and to what extent variation is tolerable in system and how it arises.

QUESTION: So in essence, you started to look at language from the point of view of acquisition and comparing what experience children have and contrasting that with the knowledge that they seem to express when they learn to speak.

CHOMSKY: Which is a slight shift from what was done. Actually it's a significant shift of perspective but there are some similarities. The structural linguistics of the day didn't raise these questions but it raised a similar question. It raised the question of what were called discovery procedures. Suppose you're going out to study Cherokee, and you know nothing about it. When I was taught linguistics you were taught field techniques, so you were taught techniques for going out into the field and finding a Cherokee informant. Then the set of procedures that you're supposed to use, that carry you slowly through interaction with the informant to give you data and gradually giving you a grammar of the language, that's the discovery procedures. Well that has sort of a slight similarity to the problem of language acquisition. If you imagine the linguist in the position of the child and the informant in the position of the environment and the procedures playing something of the role of the interaction, there's a sort of a vague similarity. Of course the similarity doesn't go very far. The child is built to know language. The anthropologist is not built to know Cherokee, so in fact the analogies break down pretty fast but the transition from one point of view to another was not as radical as it might seem because of the loose analogy.

QUESTION: But there was the shift from simply finding out the rules of language for its own sake. You were looking at it in a different way.

CHOMSKY: You could put it that way, but I would also say that there was a shift with regard to finding the rules of language at all. Traditional linguistics did not try to find the rules of language. It thought it was doing it but as soon as you took a close look at what was happening, you saw that it wasn't really doing it at all, it was just giving a certain amount of information which could be used by somebody who already tacitly knew the rules of language, to sort of add in the rest.

Let me take a simpler case. Take a look at the Oxford English dictionary and look up the meaning of some word you don't know. Well it gives you lots and lots of information. Does it give you the meaning of the word? It doesn't even come close to giving you the meaning of the word. As soon as you start studying what every three year old knows about words, you find that the meanings given in the Oxford English dictionary simply are hints for someone who has all that knowledge intrinsically. Those hints will tell you "okay it's this word not that word" but most of the knowledge isn't even addressed and if you want to understand what the language really is, well you have to address the knowledge that's tacitly presupposed. If your purpose is to provide something useful for someone who already knows the language, well then do it exactly the way its been done. But these are different goals.

This distinction magnifies radically as soon as you go beyond single words to look at expressions of the kind that you and I are now using where the richness of understanding goes vastly beyond anything that begins to be described in even the richest traditional

grammar. So the main goal was find the actual rules of language. Then the next goal would be explain how they got there. Well to explain how they got there you have to go back and ask what's the initial state of the language faculty. What's it's initial design, presumably common to the species, because we're not adapted to learn one language or another? So what is the initial design of the common language faculty that enables it to take these highly intricate, closely articulated, delicately structured forms very rapidly on the basis of minimal interaction with the environment. It's a typical problem of growth, you know of growth of organs - in this case the growth of the language organ.

QUESTION: What are the features of language that must be, at least partly, innate?

CHOMSKY: Every feature of language from the articulatory gestures to the meanings of words, to the ways sentences are constructed. As soon as you begin to describe accurately the way these work, you see at once that the evidence from the environment does not determine those choices. In fact it allows those choices but allows innumerable other choices and there is no point in the whole system where you fail to find this. It isn't noticed, only because of the pre-supposition that how else could it be.

Maybe the easiest way to think about it is simply to look at the meaning of words. Take the word "book", a simple word. What do we know about the meaning of the word? Well, we know for example that a book can be something quite concrete like you have a book sitting next to you that weighs two pounds. That's concrete. We also know that a book can be quite abstract, like I can have the same book that you have. We both went to the library, there were two copies of Tolstoy's "War and Peace" in the library, you got one, I took out the other. We took out the same book from the library. In that sense the word is abstract. Of course from another point of view we took out different books from the library. Namely different copies of it. So the word book is simultaneously both abstract and concrete and in fact we can use it with one use adopting simultaneously it's abstract and it's concrete interpretation. So I can say that John's book is in every store in the library. Well the thing that's in every store is something concrete, his book is something abstract. I can say that if you ever write that book you're planning it will weigh at least five pounds. There combining the concrete and abstract usage. I'm using the pronoun "it" to refer to both of them simultaneously. And it just goes on like this.

Every word of the language is like this. Combinations of words add simply richer layers of complexity. If we go down from the word to the things that constitute it, that is its actual sounds and the way they're put together, we find very much the same. There is simply rich knowledge that everyone has automatically. You can't possibly be taught it, like no one ever taught anyone that the word book is simultaneously abstract and concrete. These are aspects of language that you find where ever you look. The reason that this was not taken for granted is that the knowledge was simply presupposed.

QUESTION: What is it about the grammars of natural language that can't be inferred just from the input?

CHOMSKY: To infer anything from an input you have to have a specific method of deriving information that leads you to that result. So we ask what aspect of grammar forces us to assume that there are highly specific ways of getting the result? Answer: every aspect. There are no generalised mechanisms known for looking at masses of data and yielding this specific analysis. They'll yield any analysis depending on how you tune them. When you begin to look at the actual properties of very simple expressions you can begin to determine the principles that are being used. So for example, take the sentence "John ate an apple". Let's say we've gotten to the point where the child understands that. We hear "John eats". Let's say the child understands that to mean John is eating something-or-other, not necessarily an apple. Well there's a kind of a principle. The principle says that if something is missing that belongs there, you understand it to mean something-or-other, okay that's natural. Take it a step further. Take the sentence "John is too stubborn to talk to Bill". Okay, that means John is so stubborn that he won't talk to Bill. Drop out the last word Bill, just like we dropped out the last word apple, "John is too stubborn to talk to". Well, by the principle we just used it ought to mean John is so stubborn that he won't talk to someone-or-other which is perfectly sensible but it doesn't mean that. It means that John is so stubborn that someone or other won't talk to him, John, so we invert the interpretation. We're dealing with tiny sentences, seven word sentences. Build this up a little bit it gets even more complex. "John is too clever for anyone to catch". Who's doing the catching? Well you can figure it out.

Even the most elementary look at expressions shows that they're being interpreted in very specific ways on the basis of information that simply isn't available. A child can go through its whole life without having heard evidence relevant to these interpretations and they're known instantly. And we furthermore know that they're understood at a very early age. In fact the better the experiments are being done, the earlier it turns out the things are understood. Now, if someone can come along with a general learning procedure, that will extricate precisely this information, not other information out of disorganised data, everyone will applaud but I don't think any serious biologist is waiting for it. It's like expecting some generalised growth procedure to turn a chicken embryo into a chicken, just on the basis of the nutritional inputs available. It's not a sensible proposal.

QUESTION: What you're saying is that in no case is the child's input anywhere near rich enough for them to infer the language. How does this relate to the children in Nicaragua and their experience.

CHOMSKY: Well there is a preliminary point that has to be established and that is that so called sign language involves the same or similar mechanisms as spoken language. That wasn't assumed some years ago, but now there's pretty strong evidence to indicate that that's true. So it looks as though when you study sign language you're studying a different manifestation of very much the same internal systems. With that assumption in place we can then proceed to address questions of the kind you're raising.

Suppose we had a case where a child learned say a spoken language with no evidence at all. That would be an extreme case and it would certainly be interesting but to be frank it wouldn't tell us a lot that we don't already know because the fact is that the evidence is

already so impoverished that an enormous amount can be learned about the nature of the state attained, simply by comparing that state to the evidence available. Again the analogy to growth is normal, say growth of the visual system or growth of an embryo to a chicken. If you could get a chicken embryo to go to a chicken with no environmental input at all, that would be interesting, but it wouldn't teach you a great deal more about chickens, because the main problem is that the structure and nature of the input in the environment is far too impoverished to say anything about that specific course of development from embryo to chicken.

It does add something however and that's this case. Here's a case where a language-like system was created on the basis of, it seems, no input just by interaction. So you do see in a somewhat pure form the way the principles are developing under these particular circumstances. It's as if you could experimentally study the growth of the visual system of the cat without environmental inputs - just enough pattern stimulation to ensure that the system functions. Then you could see what happens when there's no effect of the environment then you certainly learn something. How much more you would learn well we don't know, you have to see.

QUESTION: Does this situation give us insights to what is required? We know that a child on their own exposed to no input doesn't acquire a language.

CHOMSKY: No we don't actually know that. All we know is that it doesn't happen. But so many things are going on that you can't really answer the question why its not happening. It's entirely possible, indeed likely, that some kinds of normal human interaction are required to get any system functioning. Children don't even grow properly if they're not treated with human sympathy let's say. Whatever effect it has is detectable in things like weight, let's say or ability to walk. What is required to get the language system working we really don't know. So for example it's unknown really whether a child could learn language from television. There's anecdotal evidence about this but it's not the kind of thing you do experiments about. So the answer is really not known. Notice if you watch television you're getting an enormous amount of data but it may be that it's not the kind of interaction that stimulates the system to function and much more impoverished data between two year olds talking might be sufficient to get the system to function. These are hard questions in any aspect of growth of organisms in particular in this one.

We don't allow ourselves fortunately to do human experiments and therefore cannot do the kind of experiment which would sharpen up our understanding of exactly what kind of interaction, and what kind of evidence, is required to get the language organ moving in its natural way and to shape and direct it - so you have to rely on natural experiments. Notice in the case of the visual system, a lot of these questions are answered so its understood pretty well what kind of early stimulation must be given to the visual system to enable it to function in its normal way and how modifications in that early stimulation change the ways it functions. The reason that's known is because we do experiments rightly or wrongly on cats and monkeys, and it's assumed that cats and monkeys have more or less the same visual system. But you can't do experiments on the language

organs of cats and monkeys because they don't have any. It seems to be a unique human possession. You have to go to insects to find any even remote analogies - meaning no serious connection. So here we have a system which is distinctive for the species. We don't permit ourselves to experiment with the species and therefore natural experiments of this kind are rich in significance and one wants to draw from them, whatever one can.

The Nicaraguan case appears to be a very rich example, the richest yet known, of a natural experiment in which a language-like system, maybe an actual human language, was developed on the basis of no external input as far as we know and that's intriguing.

QUESTION: What are the implications of this natural experiment?

CHOMSKY: It should provide further understanding of exactly what is needed in order to get the system working and just why it takes certain forms and not others. Here you have a case where you've minimised the input. And therefore when you look at the output you learn more about the initial state. I mean the logic of the situation is quite straight forward. There's some initial state of the system, genetically determined; there's some outside interaction; there's a state that it attains. You're interested in the initial system, and the more you minimise the input and then compare the output with the initial state, the more you learn about the initial state. Exactly the same when you're studying the visual system, except there you can do it by direct experiment on other organisms. Here we can't do and therefore this is the closest analogue that nature can provide to the kind of experiment that would be done if we allowed Joseph Mengele a free reign.

QUESTION: Does this give us additional insight into the discontinuity between gesture and true language.

CHOMSKY: It could and that discontinuity is not too well understood. Humans have complicated gestural systems. I'm doing all sorts of things with my hands and there's all kind of body language as it's called. This isn't terribly well understood but it's more or less assumed, probably realistically, that the gestural systems are continuous with the gestural systems of other primates. It's Darwin's assumption and probably plausible. Until fairly recently it was supposed that sign language is a gestural system. The big discovery a couple of decades ago was that its not a gestural system, it's a language like system, which is something quite different. I mean after all, even speech involves gesture. Articulatory gestures they're called, like you move your tongue and your lips and so on. But these are very much unlike the kinds of gestures by which you indicate anger you know emotion or pointing and so on. Those differences began to be perceived in the study of sign in very interesting ways.

Some of the most interesting work on this was done by Laura Petitto who studied the development of sign and gestural systems in very young infants and found that according to her results though they often have physically the same gesture, they fit in to different systems. So that when a normal hearing child is going through the babbling stage, the non-hearing child is going through a comparable stage but with gesture. If we could get

in to the brain we'd probably find that different parts of the brain are involved in controlling and interpreting these motions.

As more has been learnt, the gestural systems and the linguistic systems come apart more and more - they appear to be different in their very basic nature. Language systems are discrete. I mean there's a three word sentence and there's a four word sentence but there's no three and a half word sentence. And infinite, they can go on forever. Its fundamentally a system of discrete infinity, rather rare in the biological world I should say. The gestural system is not, it's continuous. So if that motion indicates disparagement let's say, then (a larger) motion will indicate more disparagement and there's anything in between. It's not broken down into a discrete system which follows certain rules and principles and so on. At its very core, it seems to involve completely different principles than the language system. These distinctions show up in striking ways in sign language. Striking what appeared to be the same physical motions are involved, just falling in to different systems.

QUESTION: Why is it that children have this incredible ability to actually create a language when normally they are only required to learn an already existing language ?

CHOMSKY: Well superficially it may seem surprising that a child should be designed, engineered if you like, to create language from nothing. But when you think about it it's not surprising. Every child creates language from essentially nothing, just as every child creates a visual system from essentially nothing. The inputs to the visual system don't form the visual system. The same is true of the circulatory system or the immune system, or having legs rather than wings and so on. I mean every aspect of an organism is created, it grows from internal instructions.

In the case of humans, one fundamental part of their nature is a language organ and they plainly are designed, somehow, to develop this organ. As in other cases, it probably requires some triggering stimulation and gets some shaping from the environment but not very much as in other cases. This example is dramatic because it shows that just the interpersonal interaction without the linguistic evidence was apparently sufficient to trigger the development of the system and the system then grew along the ways in which it's programmed to grow. But this is just a more extreme example of what every child is doing.