

Heritage & Innovation: A Review in Linguistic Research

——A Dialogue between Chomsky and Weiwen Zhang

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August 18, 2018

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Abstract: Recently Professor Noam Chomsky---an outstanding scholar, linguist, the lifelong professor of MIT, USA, accepted the interview from the author. And talked about a wide range of topics which involved academic research, education, innovation, building first-rate university and some hot international issues. Importantly, Professor Chomsky gave his insightful views about these issues, which will be very helpful for us to objectively realize both academic and political issues in the worldwide.

Key words: Chomsky; academic research; education; innovation; first-rate university; international issues

Dear Prof. Chomsky:

Thanks very much for your reply. I do agree with your suggestion. Then I do like to ask you three questions as the beginning:

Chang: As an outstanding scholar around the world, what do you think of the most important quality as a scholar or researcher?

Chomsky: Honesty, diligence, open mind, curiosity, ... -- the simple virtues

Chang: As your theories has influenced Chinese scholars and students so much, what do you think of current linguistic\historical and relevant studies in China?

Chomsky:I don' t know a great deal about them. **My impression is that there is a long way to go to reach the standards to which a great civilization like China' s should aspire**

Chang:For such a long time, even today, in most institutions in China, some academic fields like philosophy, history, linguistics and other arts fields always in an inferior position compare with those natural sciences. What do you think of this situation? Could you give some suggestion about it?

Chomsky: A problem to be overcome. As to how, you know much better than I do, I' m sure.

Chang: Now a large number of Chinese linguists and researchers pay more attention to course analysis, micro studies. As an outstanding linguist around the world, what do you think of this phenomena? Could you give some suggestion about it?

Chomsky: I don' t find it very interesting or important. Judgments differ.

Chang: As one of most influential linguistic theory in 20th century, could you introduce the background of syntactic theory?

Chomsky: OK. I do like to talk about it. It had a radical change in linguistic research 50 years ago, which based on the change of cognitive science became core parts of relevant fields(anthropology, psychology, physiology, biology, arts, etc.). This led to revolutionary changes in these fields, including its methodology

and paradigm.

With this change, linguistic research turned to individual units, my granddaughters for example. We ask what special properties they have that underlie an obvious but nonetheless remarkable fact. Exposed to a world of "buzzing, booming confusion" (in William James' s classic phrase), each instantly identified some intricate subpart of it as linguistic, and reflexively, without awareness or instruction (which would be useless in any event), played important role which led to knowledge in relevant fields, also including linguistics, in one case, a variety of what is called informally "English" , in another a variety of "Spanish" . It could just as easily been one of the Chinese languages, or an aboriginal language of Australia, or some other human language . Exposed to the same environment, their pet cats (or chimpanzees, etc.) would not even take the first step of identifying the relevant category of phenomena, just as humans do not identify what a bee perceives as the waggle dance that communicates the distance and orientation of a source of honey.

All organisms have unique structures that lead them to meet with their environment in suitable ways. Some of them are called "mental" or "cognitive" , informal designations that need not be made precise, just as there is no need to determine exactly where chemistry ends and biology begins. The development of cognitive systems, like others, is influenced by the environment, but the general course is genetically determined. Changes of nutrition, for example, can have a dramatic effect on development, but will not change a human embryo to a bee or a

mouse, and the same holds for cognitive development. The fact is completely proved that among the human cognitive systems is a "faculty of language" (FL), from the perspective of traditional one: some branch of (mostly) the brain. Except severe pathology, FL is close to uniform for humans: it is a genuine species. The "original state" of FL is determined by the common human genetic endowment. Exposed to experience, FL passes through a series of states, normally reaching a relatively stable state at about puberty, after which changes are peripheral: growth of vocabulary, primarily.

It is well known that each side of language---sound, structure, means of words and more complex expressions---is normally restricted by the properties of the original state; these restrictions underline and account for the special richness and flexibility of the systems that appear. It is undoubtedly right that scope and limits are intimately related. The biological endowment that allows an embryo to become a mouse, with only the most meager environmental "information" , prevents it from becoming a fly or a monkey. The same must be true of human higher mental faculties, assuming that humans are part of the biological world, not angels.

We can think of the states attained by FL, including the stable states, as "languages" : in more technical terminology, we may call them "internalized languages" (I-languages). Having an I-language, a person can become the innovative one in language use that has traditionally been considered a primary indication of possession of mind; by Descartes and his followers, for example. The person can generate new expressions in a wide range of categories, expressions

that are suitable to surroundings and situations but not caused by them, and which stimulate thoughts in others that they might have shown in similar ways. The nature of these abilities remains as obscure and puzzling to us as it was to the Cartesians, but with the shift of perspective to "internalist linguistics" , a great deal has been learned about the cognitive structures and operations that enter into these remarkable capacities.

Though observation does not bear directly on the study of human language , it is nevertheless of interest that FL emerges to be biologically isolated in critical aspects, therefore a species property in a more obvious sense than just being a common human possession. To mention only the most obvious respect, an I-language is a system of discrete infinity, a generative process that yields an unbounded range of expressions, each with a definite sound and meaning. Systems of discrete infinity are rare in the biological world and unknown in non-human communication systems. When we look beyond the most fundamental properties of human language, its unique characteristics become even more declared. In elementary aspects human language does not fall within the standard typologies of animal communication systems, and there is little reason to suppose that it evolved from them, or even that it should be treated as having the "primary function" of communication (a rather obscure notion at best). Language can surely be used for communication, as can anything people do, but it is not unreasonable to adopt the traditional view that language is primarily an instrument for expression of thought, to others or to oneself; statistically speaking, use of language is overwhelmingly

internal, as can easily be determined by introspection.

Viewed in the internalist perspective, the study of language is part of biology, taking its place alongside the study of the visual system, the “dance faculty” and navigational capacities of bees, the circulatory and digestive systems, and other properties of organisms. Such systems can be studied in different ways. In the case of cognitive systems, these are sometimes called the “psychological” and “physiological” levels—again, terms of convenience only. A bee scientist may try to determine and characterize the computations carried out by the bee’s nervous system when it transmits or receives information about a distant flower, or when it finds its way back to the nest: that is the level of “psychological” analysis, in conventional terminology. Or one may try to find the neural basis for these computational capacities, a topic about which very little is known even for the simplest organisms: the level of “physiological” analysis. These are mutually supportive enterprises. What is learned at the “psychological level” commonly provides guidelines for the inquiry into neural systems; and reciprocally, insights into neural systems can indicate the psychological inquiries that intend to reveal properties of the organism in different terms.

In a similar way, the study of chemical reactions and properties, and of the structured entities postulated to account for them, provided guidelines for fundamental physics, and helped prepare the way for the eventual unification of the disciplines. 85 years ago, Bertrand Russell, who knew the sciences well, observed that “chemical laws cannot at present be reduced to physical laws” . His

statement was correct, but as it turned out, misleading; they could not be reduced to physical laws in principle, as physics was then understood. Unification did come about a few years later, but only after the quantum theoretic revolution had provided a radically changed physics that could be unified with a virtually unchanged chemistry. That is by no means an unusual episode in the history of science. We have no idea what the results may be of present efforts to unify the psychological and physiological levels of scientific inquiry into cognitive capacities of organisms, human language included.

We may need to remember some essential lessons of the recent unification of chemistry and physics, bear in mind that this is core hard science, focus on the simplest and most fundamental structures of the world, not studies at the outer reaches of understanding that deal with entities of extraordinary complexity. Prior to unification, it was common for leading scientists to regard the principles and postulated entities of chemistry as mere calculating devices, useful for predicting phenomena but lacking some mysterious property called "physical reality" .

A century ago, atoms and molecules were regarded the same way by distinguished scientists. People believe in the molecular theory of gases only because they are familiar with the game of billiards , Poincare observed mockingly . Ludwig Boltzmann died in despair a century ago, feeling unable to convince his fellow-physicists of the physical reality of the atomic theory of which he was one of the founders. It is now understood that all of this was gross error. Boltzmann' s atoms, Kekule' s structured organic molecules, and other postulated entities were

real in the sense of the term we know: they had a crucial place in the best explanations of phenomena that the human mind could contrive.

The lessons carry over to the study of cognitive capacities and structures: theories of insect navigation, or perception of rigid objects in motion, or I-language , and so on. One seeks the best explanations , looking forward to eventual unification with accounts that are formulated in different terms , but without foreknowledge of the form such unification might take, or even if it is a goal that can be achieved by human intelligence---after all, a specific biological system, not a universal instrument.

Within this “biolinguistic” perspective, the core problem is the study of particular I-languages, including the initial state from which they derive. A thesis that might be entertained is that this inquiry is privileged in that it is presupposed, if only tacitly , in every other approach to language: sociolinguistic, comparative, literary, etc. That seems reasonable, in fact almost inescapable , and a close examination of actual work will show, I think, that the thesis is adopted even when that is vociferously denied. At the very least it seems hard to deny a weaker thesis: that the study of linguistic capacities of persons should find a fundamental place in any serious investigation of other aspects of language and its use and functions. Just as human biology is a core part of anthropology, history, the arts, and in fact any aspect of human life, so the biolinguistic approach belongs to the social sciences and humanities as well as human biology.

Chang: Thanks very much for your introduction. You revealed the nature and

significance of linguistic research from the perspective of natural science. It is very helpful for Chinese scholars. As the theory of syntactic theory is so complex, so could you make a brief introduction to us?

Chomsky: Of course, but it may make you feel tired. As I again adapting traditional terms to a new context, the theory of an I-language L is sometimes named its "grammar", and the theory of the initial state S-0 of FL is named "universal grammar" (UG). The general study is often called "generative grammar" because a grammar is considered as the one in which L generates an infinite forms of expressions. The experience relevant to the transition from S-0 to L is called "primary linguistic data" (PLD). A grammar G of the I-language L is said to meet the condition of "descriptive adequacy" to the degree that it is a true theory of L. UG is said to meet the condition of "explanatory adequacy" to the degree that it is a true theory of the original state. The terminology was chosen to produce the fact that UG can provide a deeper, better explanation of linguistic phenomena than G. G offers an account of the phenomena by describing the generative procedure that yields them; UG intends to show how this generative procedure, hence the phenomena it yields, derive from PLD. We may treat S-0 as a mapping of PLD to L, and of UG as a theory of this operation; this idealized picture is sometimes said to constitute "the logical problem of language acquisition". The study of language use reveals how the resources of I-language are employed to express thought, to talk about the world, to share information, to establish social relations, and so on. In principle, this study try to reveal the "creative aspect of

language use” , but as noted, that topic seems shrouded in mystery, like much of the rest of the nature of human behavior.

The biolinguistic turn of the 1950s resurrected many traditional questions , but was able to approach them in new ways, with the help of intellectual tools that had not previously been available : in particular, a clear understanding of the nature of recursive processes, generative procedures that can characterize an infinity of objects (in this case, expressions of L) with finite means (the mechanisms of L). As soon as the inquiry was seriously undertaken, it was discovered that traditional grammars and dictionaries, no matter how rich and detailed, did not address central questions about linguistic expressions. They basically provide “hints” that can be used by someone equipped with FL and some of its states, but leave the nature of these systems unexamined. Very quickly, vast ranges of new phenomena were discovered, along with new problems, and sometimes at least partial answers.

It was recognized very soon that there is a serious tension between the search for descriptive and for explanatory adequacy. The former appears to lead to very intricate rule systems, varying among languages and among constructions of a particular language. But this cannot be correct, since each language is attained with a common FL on the basis of PLD providing little information about these rules and constructions.

The dilemma led to efforts to discover general properties of rule systems that can be extracted from particular grammars and attributed to UG, leaving a residue simple enough to be attainable on the basis of PLD. About 30 years ago, these

efforts converged in the so-called "principles and parameters" (P&P) approach, which was a radical break from traditional ways of looking at language. The P & P approach dispenses with the rules and constructions that constituted the framework for traditional grammar, and were taken over, pretty much, in early generative grammar. The relative clauses of Hungarian and verb phrases of Japanese exist, but as taxonomic artifacts, rather like "terrestrial mammal" or "creature that flies". The rules for forming them are decomposed into principles of UG that apply to a wide variety of traditional constructions. A particular language L is determined by fixing the values of a finite number of "parameters" of S-0: Do heads of phrases precede or follow their complements? Can certain categories be null (lacking phonetic realization)? etc. The parameters must be simple enough for values to be set on the basis of restricted and easily obtained data. Language acquisition is the process of fixing these values. The parameters can be thought of as "atoms" of language, to borrow Mark Baker's metaphor. Each human language is an arrangement of these atoms, determined by assigned values to the parameters. The fixed principles are available for constructing expressions however the atoms are arranged in a particular I-language. A major goal of research, then, is to discover something like a "periodic table" that will explain why only a very small fraction of imaginable linguistic systems appear to be instantiated, and attainable in the normal way.

Note that the P&P approach is a program, not a specific theory; it is a framework for theory, which can be developed in various ways. It has proven to be

a highly productive program, leading to an explosion of research into languages of a very broad typological range, and in far greater depth than before. A rich variety of previously-unknown phenomena have been unearthed, along with many new insights and provocative new problems. The program has also led to new and far-reaching studies of language acquisition and other areas of research. It is doubtful that there has ever been a period when so much has been learned about human language. Certainly the relevant fields look quite different than they did not very long ago.

The P & P approach, as noted, suggested a promising way to resolve the tension between the search for descriptive and explanatory adequacy; at least in principle, to some extent in practice. It became possible, really for the first time, to see at least the contours of what might be a genuine theory of language that might jointly satisfy the conditions of descriptive and explanatory adequacy. That makes it possible to entertain seriously further questions that arise within the biolinguistic approach, questions that had been raised much earlier in reflections on generative grammar, but left to the side: questions about how to proceed beyond explanatory adequacy.

It has long been understood that natural selection operates within a "channel" of possibilities established by natural law, and that the nature of an organism cannot truly be understood without an account of how the laws of nature enter into determining its structures, form, and properties. Classic studies of these questions were undertaken by D'Arcy Thompson and Alan Turing, who believed that these

should ultimately become the central topics of the theory of evolution and of the development of organisms (morphogenesis) . Similar questions arise in the study of cognitive systems, in particular FL. To the extent that they can be answered, we will have advanced beyond explanatory adequacy.

Inquiry into these topics has come to be called "the minimalist program" . The study of UG seeks to determine what are the properties of language; its principles and parameters, if the P& P approach is on the right track. The minimalist program asks why language is based on these properties, not others. Specifically, we may seek to determine to what extent the properties of language can be derived from general properties of complex organisms and from the conditions that FL must satisfy to be usable at all: the "interface conditions" imposed by the systems with which FL interacts. Reformulating the traditional observation that language is a system of form and meaning, we observe that FL must at least satisfy interface conditions imposed by sensorimotor systems (SM) and systems of thought and action. Sometimes called "conceptual-intentional" (CI) systems. We can think of an I-language , to first approximation, as a system that links SM and CI by generating expressions that are "legible" by these systems, which exist independently of language. As the states of FL are computational systems, the general properties that particularly focus on us are those of efficient computation. A very strong minimalist thesis would hold that FL is an optimal solution to the problem of linking SM and CI, in some natural sense of optimal computation.

Chang: Thanks again for your introduction. It is really difficult for us to understand

your theory, but we will consider it carefully. However, you just mentioned “minimalist” . Could you make a brief introduction about it? And as an outstanding linguist around the world, could you talk about the future of linguistic research?

Chomsky: Thanks for your patience. I do like to talk about them. Like the P&P approach that provides its natural setting, the minimalist program formulates questions, for which answers are to be sought---among them, the likely discovery that the questions were wrongly formulated and must be reconsidered. The program resembles earlier efforts to find the best theories of FL and its states, but poses questions of a different order, hard and intriguing ones: Could it be that FL and its states are themselves optimal, in some interesting sense? That would be an interesting and highly suggestive discovery, if true. In the past few years there has been extensive study of these topics from many different points of view, with some promising results, I think, and also many new problems and apparent paradoxes.

Insofar as the program succeeds, it will provide further evidence for the Galilean thesis that has inspired the modern sciences: the thesis that “ nature is perfect” , and that the task of the scientists is to explain this, whether studying the laws of motion, or the structure of snowflakes, or the type and growth of a flower, or the most complex system known to us, the human brain.

The past 50 years of the study of language has been rich and inspiring, and the prospects for moving forward seem exciting, not only within linguistics narrowly

conceived but also in new categories, even including the long-standing hopes for unification of linguistics and the brain sciences, a charmingly prospect, already emerged, as I predicted 30 years ago.

Chang: it is really a fascinating prospect. However, I do like to talk about another topic. It is well known that there are quite different between China and US in education. What do you think of these two different education systems? And which will be better for cultivating students with innovative spirits?

Chomsky: The American system has many flaws, but it is much better in these respects.

Chang: Now many Chinese universities plan to build first-rate universities in the worldwide. As an outstanding scholar, What do you think of the most important sides that a first-rate university should have? Could you give some suggestion about it?

Chomsky: It should cultivate and encourage free and open inquiry.

Chang: Thanks very much for your reply and answers, which gave us great enlightenments. Now I do like to ask you the last three questions as the end of this paper-interview. Can we expect that Chinese scholars can produce theories that are widely accepted in the worldwide in this century or next?

Chomsky: Every reason to expect it. I presume that it' s happening right now.

Chang: Now a Chinese female scientist won the Nobel Prize in medicine and biology, but she is the one without PhD degree and not the member of CAS. As an outstanding scholar around the world, what do you think of this phenomena?

Chomsky: **Know nothing about this particular case.**

Chang: As many Chinese scholars and students are very interested in your outstanding discussions with Jean Piaget 50 years (?) ago, and with Michel

Foucault 30 years (?) ago. Could you introduce something about these attractive discussions ?

Chomsky: Both of these have been published. If you have further questions about the discussions, I can try to answer.

Chang: Some people think that Paris attack is the confliction of civilization. What do you think of it? Do you think it's a reconcilable one between socialism and capitalism?

Chomsky: ISIS is trying hard to turn it into a "conflict of civilizations," and we can choose - stupidly - to fall into that trap. It is nothing of the sort. And it has nothing to do with socialism-capitalism.

Chang: It's said there are still about 70% of the world that are unknown to human beings in the world. Whether it means it may need a revolution in both natural science and social sciences? What do you think of it?

Chomsky: **It means more work.** A friend who works in India told me that they have recently found 100 previously unknown languages. **We understand very little even about ourselves. There is a huge amount of challenging work to do.**

Chang: As there are so many fans of you in China. And they do want to know something about your health. So could you tell me something about it? And can we expect that you can make a trip to China in the near future?

Chomsky: Appreciate the concerns, but I'm fine. I'm hoping to find a way to make another trip to China, a fascinating country, but demands and commitments are very intense and it is hard to arrange foreign travel.

Chang: Thanks again for your answers. We do expect to meet you in China in the near future.

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