Linguistic Productivity and Chomskyan Grammar: A Critique

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Language Universals as Innate Knowledge

The central research objective in linguistics, according to Chomsky (1957; 1965; 1975) is to determine and to characterize universal properties of language. According to Chomsky, linguistics is the study of language universals. Chomskyan universals have two interesting features. First, these universals are not to be understood as Platonic universals (Chomsky 1980, 28-29). Language universals are not something that any language should have. In fact, there might be some artificial languages that are not based on Chomskyan language universals. Language universals are universal, not in the sense that there are some principles that any natural or artificial languages should satisfy but in the sense that human languages actually share the same body of linguistic constraints (Chomsky 1980, 45). Language universals delimit the range and type of properties shared by all human languages.[1] Second, Chomsky and Pinker (Chomsky 1965; 1975; 1986; Pinker 1994) hypothesize that these universals are innate and biologically determined. The general structure of this innate knowledge, according to Chomskyan hypothesis, is fully fixed and genetically inherited (Chomsky 1979 140; 1975, 28, 34).

From the study of language universals, we can build universal grammar. Universal grammar is the systematized principle of human innate knowledge of language. Universal grammar is expected to explain the following.[2]

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1) It is an open question whether there really are such things as language universals. Each natural language might be founded upon different sets of grammatical principles. For example, Korean and Japanese seem to share many linguistic features in common, but Korean and English look totally different. What does it mean to say that all human languages share the same sets of linguistic principles? This question leads us to the second feature of language universals.

2) Grammar, here, means a mentally represented system of rules. It is not the grammar (rules of correct use of language) we learned from school. See Chomsky 1968, 116 n.1.

>**Language Acquisition**: Humans can learn any human language as their mother tongue in a very short period of time. Children can learn to speak their mother tongue even without proper stimulation.
>**Language Variation**: There are many different languages with different grammatical (surface) structures.
>**Linguistic Productivity**: Humans can generate and understand an unbounded number of grammatical sentences.

Universal grammar explains typical patterns of language acquisition, language variation, and language production. Language variation can be explained by differences in parameters each language has. Basic principles stay the same, but languages are different in their details of variable features, such as the position of verb and subject in the utterances (at the level of 'spelling out'). Language acquisition, seen in this way, is understood as parameter setting, not as principle building; principles are innately given. Productivity is explained by basic rules of universal grammar. Limited number of rules can generate infinite number of sentences via the procedure called recursion. Given the elementary pieces (words and phrases) our language system applies the rules repeatedly to build up complex sentences. That is, universal grammar has a recursive structure.

Problems of Chomskyan Theory

As I have discussed above, universal grammar proposes to explain not only the universal characters of human language but also the specific features of many natural languages. None of these initial goals are successfully achieved, however. There are three major problems with Chomskyan approach. In what follows I will briefly discuss these problems.

To begin with, there are two problems of methodology. First, to find language universals, Chomsky used language intuition as primary evidence. Chomsky argued that it was legitimate to make use of the linguist's introspection and reflections on her own use of language (Chomsky 1957; 1965). In other fields of science, however, introspection is not acceptable as a possible source of evidence. Second, some questions are raised about the nature of innate knowledge we have of human language. What does it mean to say that we have innate knowledge of human

language? The knowledge is implicit in the sense that we do not have any conscious access to that knowledge; we can only have access to external applications of the knowledge. If we do not consciously know that we have such complex rules, i.e., universal grammar in our head, how can we say that we 'know' universal grammar?

The second problem tackles the generative side of universal grammar. Overgeneration is the problem here. Chomsky's idea that a generative grammar can generate all and only all the expressions of a given language without any auxiliary devices to remove ungrammatical expressions is problematic (Chomsky 1965). The problem is that the grammar over-generates. Chomsky and Lasnik (1977) had to introduce an auxiliary device, a 'filter,' to eliminate ungrammatical expressions that the initial generative mechanism allows.

Third, there is an alternative approach to universal grammar. Chomsky's approach is not the only way to study language universals. According to currently dominant Chomskyan view (principle and parameters theory, PPT)[3] all languages share a core of inviolable principles but differ syntactically as a result of how certain details (parameters) of each principles are stated. According to PPT, principles are not violated but they have open parameters allowing different values for different languages. With this combination of seemingly fixed principles and flexible parameters, universal grammar can explain generality of universal grammar and specificity of different language at the same time. The same problem, however, can be explained from a different theoretical perspective. Optimality theory, originally proposed as a theory of phonology can do the same job without proposing inviolable and absolute principles (Archangeli and Langendoen 1997). Syntactic application of optimality theory is not fully developed yet but it presents a viable alternative to Chomskyan universal grammar. If optimality theory gains any

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3) Chomsky (1988, 62-63) explains the notion of parameter-setting as follows: "The principles of universal grammar are exceptionless because they constitute the language faculty itself, a framework for any particular human language, the basis for the acquisition of language. But plainly languages differ ... the principles of universal grammar have certain parameters, which can be fixed by experience in one or another way. We may think of the language faculty as a complex and intricate network of some sort, associated with a switch box constituting of an array of switches that can be in one of two positions. Unless the switches are set one way or another, the system does not function. When they are set in one of the permissible ways, then the system functions in accordance with its nature, but differently, depending on how the switches are set.... The data presented to the child learning the language must suffice to set the switches one way or another. When these switches are set, the child has command of a particular language and knows the facts of that language."

success, universal grammar cannot claim the only truth in the field.

Linguistic Productivity

In addition to these general problems, there are many other technical problems. In this paper, however, I will discuss linguistic productivity. I think linguistic productivity is not properly understood in Chomskyan approach. Chomsky (1968) has claimed that our linguistic competence allows us to generate an infinite number of sentences. It goes without saying that no one can utter or understand infinite number of sentences. What Chomsky means by unbounded productivity is that, despite the factual constraints on performance, our linguistic competence can generate unbounded productivity. Cognitive resources such as memory and attention can limit productivity. Under ideal performative conditions, however, we can speak and understand an unbounded number of sentences. Thus the claim, in principle, argues for the unbounded generative power of universal grammar.

Here, I have two problems. First, does universal grammar support unbounded linguistic productivity? Second, what is this idealized linguistic competence that is based on universal grammar? I will argue that our linguistic capacity is in fact bounded and linguistic productivity is limited. I will show that Chomskian grammar is too idealistic and detached from the psychological basis of language processing.

Center Embedded Sentences

Consider the following sentence.

1. The rapidity the motion the wing the hummingbird has has has is remarkable.

The sentence has center embedded structure. Like an onion, a center embedded sentence has several layers of identical syntactic structures. Sentences of this structure look very strange and even ungrammatical, but a careful syntactic analysis will show that they are indeed grammatical. It seems, however, that we never speak and understand this kind of sentence. If it is grammatical, why do we not use (speak and

understand) it? Does our linguistic competence have unbounded productivity?

As I briefly sketched above, Chomsky's productivity hypothesis is not affected by center embedded sentences (Chomsky 1965). The problem of center embedded sentences can be solved if we focus on the limited nature of computational resources used in natural language processing. If we can separate the constraints of performance (limited computational resources) from pure competence (unbounded productivity), we can explain grammatical, though weird, center embedded sentences (Chomsky 1965, Ch. 1; 1981).[4] Hence unbounded productivity is understood as the capacity to generate infinite number of grammatical sentences without being disturbed by other factors such as limited memory and attention. With more memory and attention we can understand and speak those strange center embedded sentences. For instance, the sentence above has 8 different items, which is more than can be stored in our short term memory (Miller 1956).[5] The sentence can not be properly understood in a short period of time because it is beyond our memory load. Please note that idealization, here, does not mean absolute idealization. Our language competence is not idealized in the sense that it can do anything no matter what. It is unboundedly productive in the sense that, other things being cooperative, it can produce an infinite number of grammatical sentences. Obviously, 'other things' here point to non-linguistic constraints, including computational resources such as memory and attention. Sometimes, this idealization is compared with our capacity to add numbers (Fodor 1983, 9; Pinker 1994, 206). Based on simple principles of arithmetic we can add an unbounded number of sums. Does this mean that we can add a very long series of numbers quickly? Probably we need a pencil and paper to compensate for our limited our memory and attention. It seems that we need this kind of idealization to

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4) Competence means the language user's tacit knowledge, and performance means the way that knowledge is put to use. Performance is affected by all kinds of non-linguistic influences such as tiredness, drugs, and distraction. However, the underlying system of knowledge, i.e., competence stays the same. The job of a Chomskyan linguist is to study the tacit knowledge. Chomsky says, "linguistic theory is concerned primarily with an ideal speaker-listener, in a completely homogeneous speech-community, who knows its language perfectly and is unaffected by such grammatically irrelevant conditions as memory limitations, distractions, shifts of attention and interest, and errors (random or characteristic) in applying his knowledge of the language in actual performance.... To study actual linguistic performance, we must consider the interaction of a variety of factors, of which the underlying competence of the speaker-hearer is only one" (Chomsky 1965).

5) According to Miller (1956), human short term memory can hold roughly unrelated items.

understand the capacity to add. Pinker nicely captures the situation when he quotes *Alice in the Wonderland* (Pinker 1994, 206).

> "Can you do the addition?" the White Queen asked. "What's one and one and one and one and one and one and one and one and one and one?"
> "I don't know," said Alice. "I lost count."
> "She can't do Addition," the Red Queen interrupted.

The same kind of idealization is needed when we understand our linguistic competence, and the productivity we have discussed so far should be understood in this way. Like Alice, we have problems in understanding and speaking some onion sentences. This limitation, however, is not the limitation of our linguistic competence. Rather, it is the limitation of the parser, the psychological processes that give syntactic structures to sentences, not the limitation of linguistic competence.

Grammar and Parser

As I have mentioned above, Chomsky distinguishes between competence and performance (Chomsky 1965). In the same way, Chomskyan theory separates grammar from parser. Competence is the innate knowledge that supports our language use and grammar is the systematized principles of that innate knowledge. In describing and understanding competence, that is to build up universal grammar, we do not depend on non-linguistic constraints. Thus grammar is purely linguistic; it is isolated from other non-linguistic constraints. Parser, on the other hand, is a psychological process that gives a syntactic structure to a given sentence. It is susceptible to all the factors that can affect language processing, including non-linguistic factors such as memory and attention.

In actual utterances, all these different principles and constraints interact. We can hardly distinguish purely lingusitic principles from other psychological constraints. But innate knowledge (we have about our natural languages) is described and explained by purely linguistic principles. Thus the distinction between grammar and parser is important in Chomskyan view.

In what follows, I will discuss the distinction between grammar (pure linguistic

principles of competence) and parser (performative constraints). First, I will show that there is a psychological constraint that works only on a specific syntactic pattern. If a constraint targets a specific syntactic pattern, why do we not say that the constraint is linguistic? I will argue that the distinction between psychological constraints and linguistic principles (grammar or linguistic competence) is not absolute. Second, I will discuss the economy principle of the minimalist program, the recent development of Chomskyan theory, which shows how cognitive constraints affect grammaticality. I will compare this with Chomsky's earlier, mathematically oriented view of grammar.

Domain Specific Memory and Center Embedded Sentences

Consider the following sentences.

1. The rapidity the motion the wing the hummingbird has has has is remarkable.
2. This is the dog that chased the cat that ate the rat that lived in the house that Jack built.
3. The man the boy the girl hit kissed moved.

As we have discussed above, the unintelligibility of sentence 1 may be explained by limited computational resources, i.e., memory overload. We cannot keep track of all the related items (noun phrases) in one memory load. It seems, however, that this explanation is not good if we compare sentences 1 and 2. Memory wise, sentence 2 is worse than sentence 1. But sentence 2 has better intelligibility than sentence 1. It appears that memory is not the only factor that affects the intelligibility. Sentence 3 has six different items but is harder than sentence 2. What makes a sentence hard to understand is not just the number of items (lexical items or phrases) the sentence has. It is a specific type of memory that matters. Even a short sentence can puzzle us if it triggers a specific memory overload. If we look at other heavily embedded and unintelligible sentences we can find that specific memory failure.

4. The dog the stick the fire burned beat bit the cat.
5. The malt that the rat that the cat killed ate lay in the house.
6. If if if it rains it pours I get depressed I should get help.
7. That that that he left is apparent is clear is obvious.
8. The cheese that some rats I saw were trying to eat turned out to be rancid.

9. The policies that the students I know object to most strenuously are those pertaining to smoking.

10. The guy who is sitting between the table that I like and the empty chair just winked.

11. The woman whom the janitor we just hired hit on is very pretty.

There are eight, three layer onion sentences above. Sentences 4, 5, 6, and 7, are almost unintelligible, but sentences 8, 9, 10, and 11, though difficult, are not as hard to understand as the first set of sentences. What makes the first set of sentences unintelligible is neither the number of items they have nor the center embedding structure, but a specific type of recursiveness in these sentences. This type of recursiveness can be found in many sentences where a relative clause is in the middle of the same kind of relative clause or where an 'if ... then' sentence is inside another 'if ... then' sentence. For example, if a noun phrase is in the middle of another noun phrase, we can hardly understand what is meant by the sentence. Many three layer, center embedded sentences with this type of recursiveness create a difficult problem. It seems that the human sentence parser fails to keep track of where it is in a sentence when it is faced with the same kind of phrase right next to each other. The memory involved here forbids the parser from storing the same type of phrase twice if the first phrase is inside the second one. This parsing constraint makes all the trouble we have about the productivity of our language competence.

Is this constraint a legitimate limitation of language competence or is it just a limitation of human language performance? According to Chomsky, this kind of constraint is not a proper part of grammar (Chomsky 1965, 10-15). They are problems of computational resources; they are constraints on language performance. If those constraints are cooperative, there will be no difference in intelligibility among the 11 sentences above; those sentences are then equally intelligible. Chomsky (Chomsky 1965) therefore argues that this low intelligibility is not the problem of competence.

I believe the parsing constraint we found in the sentences (4-11) is not just a general, non-linguistic constraint. It is a performative constraint but it is as important as a linguistic constraint and might play an important role in deciding the grammaticality of a sentence. The distinction between grammar and parser makes little sense here. There are two reasons for this skepticism. First, I will argue that there are purely linguistic performative constraints. Second, I will show that in minimalist approach, grammaticality is partially determined by the way linguistic principles are used. That is, grammaticality is partially determined by performative principles.

First, the parser has a problem in dealing with those onion sentences (4-7), not because it has insufficient memory storage but because its memory does not fit with the syntactic structure of the sentences. The memory problem we are facing now is not one of those general memory problems such as memory overload, interference, or decay. In the face of those general problems the sentence parser is powerless. Regardless of the syntactic structures, those memory problems paralyze all the effort to parse sentences. In this sense, such memory problems are general, non-linguistic. Similar problems can happen in any other cognitive area, such as remembering faces, numbers, colors, etc. But the problem we have about sentences (such as sentence number 4) is keyed to a specific type of syntactic structure. Thus the problem is linguistic, and the memory that caused the problem is domain specific, linguistic memory.

For these barely intelligible center embedded sentences, the problem is not just a simple problem of general performance. Since this memory constraint shows the way language actually works in our mind, it should be included or at least considered on a par with our language competence.

Here we found a constraint that does not belong to purely linguistic competence. It does not belong to competence because it is not about our innate knowledge of language. Nor does it belong to 'general' performance because it is a 'linguistic' constraint. Neither competence nor general performance captures the unique role played by this specifically linguistic memory constraint. Thus I propose a three-way distinction between Competence, Performance I, and Performance II. Competence is Chomskyan competence, i.e., innate knowledge of language. Performance I consists of linguistic constraints of performance. Memory structure that causes parsing problems in center embedded sentence belongs to Performance I. Performance II consists of general constraints such as memory and attention. Table 1 details the distinction.

I am not denying competence and performance distinction, here. What I am denying is the idea that grammaticality of a sentence is solely determined by competence. Constraints in Performance I, which have nothing to do with competence, are important in deciding grammaticality of sentences. Chomsky would never accept this idea, but his minimalist approach is, in fact, very close to the idea I am suggesting now. Since his economy principle imposes some constraints on 'how'

Linguistic/NonLinguistic Disctinction	Chomsky (1965)	Constraints on language production	Linguistic/Non-linguistic Distinction
Purely linguistic. Grammaticality is determined here.	Competence: (what) What is known about language. Innate Knowledge of Language. Grammaaticality is ultimately grounded on competence.	Competence: (what) Innate date structure in the human mind. Purely linguistic principles are hardwired in the human mind.	Purely linguistic. Grammaticality is jointly determined by Competence and Performance I.
Non-linguistic.	Performance: (How) How the knowledge is used. Grammaticality is not affected by performative constraints such as memory, attention, and other psychological and computational resources.	Performance I. (How) How the knowledge is used. Linguistic constraints: a. linguistic memory from center embedded sentences b. economy principle: derivation of syntactic structure, movement etc. Derivation is important in grammaticality.	
		Performance II. (How) How the knowledge is used. Non-linguistic Constraints (fatigue, drug, interest, attention, memory, etc.)	Non-linguistic.

Table 1. Competence, Performance, and Grammaticality

the innate linguistic knowledge is deployed, it can be understood as a 'performative' principle. In this approach, grammaticality is partially determined by this performative principle. Thus, with respect to grammaticality, we should re-consider competence/performance distinction. Thus, the second reason for my skepticism of grammar/parser distinction comes from the minimalist approach. Chomsky's minimalist program seems to blur the rigid distinction between purely linguistic principles (grammar) and other derivational constraints. I will discuss the economy principle, the central principle of minimalist program, by comparing it with Chomsky's earlier view on grammar.

As I have pointed out earlier, Chomsky's theory of universal grammar was motivated by mathematical logic. Mathematical logicians of the early twentieth century formulated rules that describe how rules may be put together to form a valid proof. Analogously Chomsky set out to formulate rules that describe how words may be put together to form a grammatical sentence. This was an axiomatic approach to language (Chomsky, 1957). He called a collection of rules (or axioms) for syntax a grammar. In this earlier approach, a sentence is grammatical if it is derivable from given rules and axioms. Derivation processes are understood as transformation processes that, following the rules of grammar, take deep structure into surface structure.

In this axiomatic approach, derivation is fully controlled by transformation rules but it is not controlled by the way a grammatical sentence is generated. Any derivation is acceptable if the rule is not violated. For example there are two different ways to derive a mathematically valid sentence, 2 x 3 = 6. One way is to use a multiplication rule (if there is any) and directly derive 2 x 3 = 6. The other way is to derive the same sentence via rule of addition and translation of multiplication into addition. 2 x 3 = 6 is valid because a. it directly follows from a multiplication rule, or, b. it is indirectly derivable from an addition rule, i.e., 2 + 2 + 2 = 6. Thus a and b are different derivations; they have different computational complexity but are equally acceptable derivations since neither violates any rule. Grammatical sentences are seen in this way. If a sentence is successfully derived from transformation rules, it is grammatical. Even though the derivation processes are long, and though the sentences derived are complex and unintelligible, those sentences are as good as simple and intelligible sentences. In short, grammar only concerns whether the given derivation works or not. It does not concern how long or complex the derivation is.

This mathematical approach is sharply contrasted with the minimalist approach. In the minimalist program, grammar is understood from the perspective of economy in the mental construction of grammatical sentences. Here are the main features of the economy principle.

> **Least Effort**: Make the fewest number of moves possible.
> **Procrastinate**: Do not move overtly unless overt movement is forced by some UG principle.
> **Greed**: Do not move X unless X itself has a feature that is satisfied via that movement.
> **Minimality**: Movement must be to the closest possible landing site.
> **Minimize Chain Links**: Long-distance dependencies must be as short as possible.

In applying the economy principle, Chomsky asserts that economy in derivation is part of grammatical constraint. Rather than assert that that grammar should include parsing constraints, Chomsky's minimalist approach but it reflects problems of actual derivation processes in terms of economical movement. It seems that the distinction between purely linguistic competence and other linguistic constraints is minimal in the economy principle.[6]

In the minimalist approach, what matters is not just the success or the failure of derivation but the 'economy' of derivation. In determining grammaticality of a sentence, different steps of derivations are compared and then (if possible) the most economical one is chosen; less economical derivations are not preferred and even sometimes ruled out. Now grammar is seen to be more closely tied to the derivation processes that underlie the construction of grammatical sentences.

There is a dilemma here. Since the economy principle is about how our innate knowledge is used in actual derivational processes, it is not about pure competence. Rather, it comes close to performance. Performative constraints are general constraints about 'how' linguistic knowledge is utilized in actual language processing. However, derivational constraints, ones that the economy principle focuses on, are purely linguistic constraints. They do not appear in any other cognitive domain. Therefore those derivational constraints do not belong to any of those.

Once again, we can see why we need the three-way distinction between

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6) Why does economy matter in linguistics? Without considering the limited nature of computational resources we can hardly understand the economy principle. Because non-linguistic considerations in language processing such as minimal movement is preferred in the economy principle, the clear cut distinction between grammar and psychological processes makes little sense.

Competence, Performance I, and Performance II (See Table 1), and why Chomsky's competence/performance distinction does not work (for grammaticality). In minimalist approach, performance ('how' the grammatical principles are used) is as important as competence in deciding grammaticality of a sentence.[7]

Conclusion

I have discussed a problem of center embedded sentences. They are grammatical in the sense that they are derivable from linguistic rules. Those sentences, however, are not easily understood. One way to explain the unintelligibility of the sentences is to separate the grammaticality of sentences from other non-linguistic constraints. In short, the unintelligibility can be explained by memory overload, a general memory problem in language processing. If the human language parser cannot analyze the syntactic structure of those sentences due to memory shortage, the problem is not that of linguistic competence, but of non-linguistic constraints—a psychological problem of language processing. The human brain has limited computational resources to deal with such complex sentences. The same shortage can affect all the other human cognitive functions such as visual perception, auditory perception, and reasoning. In this sense the problem is not a purely linguistic problem. If it is non-linguistic, grammaticality is not affected by such general psychological constraints, and thus we can safely insulate grammar from all the other non-linguistic constraints. The distinction between grammar and psychological or computational constraints is meaningfully made.

I have argued that the distinction is not absolute. First, I showed that the parser, in processing center embedded sentences, cannot handle a specific pattern of syntactic structure. The memory involved here is keyed to a specific syntactic pattern. This specifically linguistic memory causes all the problems of center embedded sentences

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7) Chomsky (1980:200-201) sometimes argues as if competence/performance distinction can be softened. "If we accept ... Lenneberg's contention that the rules of grammar enter into the processing mechanisms, then the evidence concerning production, recognition, recall, and language use in general can be expected (in principle) to have bearing on the investigation of rules of grammar, on what is sometimes called 'grammatical competence' or 'knowledge of language.' "

we have discussed above. For those center embedded sentences, the absolute distinction between grammar and parser seems to makes little sense. 'Linguistic memory,' which we discussed above, has a domain specific character. This kind of constraint should be considered as an important aspect of human language. First, this kind of constraint does not have a place in Chomskyan competence but is important when we consider actual processes where computation of linguistic representations takes place. Second, as we saw in minimalist approach, some of performative constraints (that belong to Performance I) are important in deciding grammaticality of sentences.

This connection between grammar and performative constraints is not fully considered in Chomsky's earlier theory. In recent development of his theory, however, the gap between grammar and linguistically relevant psychological constraints seems to be bridged. Chomsky's economy principle sees grammaticality as something that is based on the shortest possible movement. The principle in nutshell says that the movement that generates a grammatical sentence should be as economical as possible. Now the grammaticality of a sentence is determined by 'how' the linguistic principles are used as well as 'what' the principles are.

The lesson here is that grammaticality of a sentence is not totally separated from actual psychological processes that build up sentences. In this sense, I am skeptical about the unlimited productivity of our language capacity. Chomskyan theorist used to say that in principle our language competence has unlimited productivity. What does 'in principle' mean here? In Chomsky's earlier view, 'in principle' means 'from the purely linguistic point of view.' Ignoring psychological constraints in language processing, Chomskyan theorists could argue that humans can produce unbounded number of grammatical sentences. In Chomsky's later view, however, grammar is not completely separated from the computational constraints. Number of steps in movement is checked and only the economical' movement is allowed. If our language processing is under the control of these (performative) constraints, our productivity will have the limit. Because of these constraints, we cannot produce infinite number of grammatical sentences derivable from purely linguistic rules.

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[국문요약]

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촘스키의 언어 이론에 따르면, 인간은 무한한 수의 어법에 맞는 문장을 말하고 이해할 수 있다. 언어 창조성이라고 하는 이러한 능력은 이상화된 언어 능력을 전제한다. 사람들이 실제로 언어를 사용하여 의사 소통을 할 때는 단기 기억이나 주의 집중이라는 인지 능력의 한계로 인해 이러한 창조성에 많은 제약이 따른다. 하지만 언어의 창조성은 이러한 언어 실행 능력과는 관계없는 순수 언어 능력을 고려할 때 이해된다고 촘스키는 주장한다. 충분한 시간과 기억 능력이 보장된다면, 인간 언어 능력이 제약될 이유가 없다. 언어 창조성은 마치 덧셈을 하는 인간의 능력과 비교된다. 국민학교 산수을 공부한 학생은 덧셈을 할 수 있다. 덧셈 능력이 인간의 마음에 자리를 잡으면 어떤 숫자를 놓고도 덧셈을 할 수 있다. 물론 실제로 엄청난 숫자를 덧셈하는 데는 문제가 많다. 하지만 충분한 시간과 연필과 종이가 있다면 원칙상 어떤 숫자를 놓고도 덧셈을 할 수 있다. 본 논문에서는 필자는 이러한 언어 능력이 필요 이상 이상화되었음을 중앙 삽입형 문장들을 고찰함으로써 지적하고자 한다. 중앙 삽입형 문장 (center embedded sentences) 또는 양파 문장 (onion sentences) 들은 이상화된 언어능력의 측면에서는 문법적일지 모르지만 실제로 사람들은 이 문장들을 거의 사용하고 있지 않으며 거의 이해하고 있지도 않는 문장들이다. 그 이유는, 촘스키에 의하면, 비언어적 인지 능력의 제약 때문이다. 기억력이나 주의 집중력이 모자라서 그런 문장을 잘 쓰지 않지만 그런 조건이 따라 주면 그런 문장들이 무엇을 뜻하는 지 다 알 수 있다는 것이다. 따라서 이 문법적인 문장을 사용하지 않는다는 것이 언어 창조성에 대한 도전이 될 수 없다고 그는 주장한다. 필자는 이 문장들이 단순한 단기 기억이나 주의 집중의 문제가 아니라 실제로 인간 언어 능력의 제약을 보여 줄 수 있는 인지적 조건들을 보여 주고 있다고 생각한다. 따라서 인간의 언어 능력이 무한수의 문장을 구성하고 이해할 수 있다는 주장은 언어 능력의 인지적 제약을 고려하지 못한 주장이다.

[Abstract]

Linguistic Productivity and Chomskyan Grammar:
A Critique

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According to Chomskyan grammar, humans can generate and understand an unbounded number of grammatical sentences. Against the background of pure and idealized linguistic competence, this linguistic productivity is argued and understood. In actual utterances, however, there are many limitations of productivity but they are said to come from the general constraints on performances such as capacity of short term memory or attention. In this paper I discuss a problem raised against idealized productivity. I argue that linguistic productivity idealizes our linguistic competence too much. By separating idealized competence from the various constraints of performance, Chomskyan theorists can argue for unlimited productivity. However, the absolute distinction between grammar (pure competence) and parser (actual psychological processes) makes little sense when we explain the low acceptability (intelligibility) of center embedded sentences. Usually, the problem of center embedded sentence is explained in terms of memory shortage or other performance constraints. To explain the low acceptability, however, we need to assume specialized memory structure because the low acceptability occurs only with a specific type of syntactic pattern. I argue that this special memory structure should not be considered as a general performance constraint. It is a domain specific (specifically linguistic) constraints and an intrinsic part of human language processing. Recent development of Chomskyan grammar, i.e., minimalist approach seems to close the gap between pure competence and this type of specialized constraints. Chomsky's earlier approach of generative grammar focuses on end result of the generative derivation. However, economy principle (of minimalist approach) focuses on actual derivational processes. By having less mathematical or less idealized grammar, we can come closer to the actual computational processes that build syntactic structure of a sentence. In this way, we can have a more concrete picture of our linguistic competence, competence that is not detached from actual computational processes.