Historical Outlines of AUX in Generative Grammar
in the Light of Language Universals

Part I

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Introduction

The aim of this present paper is to describe how the category of AUX has been established and treated in the framework of generative grammar which has drastically developed its status since the appearance of Syntactic Structures by Noam Chomsky, in order to explain the definition of AUX commonly given by the contemporary generative grammarians in its relation to language universals. The category of AUX is so delicate and complex that the issues of AUX in generative grammar have been controversial among researchers during these three decades. In 1981 the present writer wrote a thesis entitled "Language Universals with Reference to AUX,"¹ from motivations for contrastive studies on auxiliaries between Japanese and English. At that time there was a trend toward a theoretical fusion of generative grammar and typological approaches which had been advanced by Joseph Greenberg and his school. The publication of "The Category AUX in Universal Grammar" in Linguistic Inquiry 10 (1979), written by A. Akmajian in collaboration with S. M. Steele and T. Wasow, was one of the typical and influential research papers in that stream. The conceptual setting of AUX in generative syntax, however, seems to have greatly changed these days, which then urges the present writer's reconsideration to the category of AUX as a universal factor, through drawing historical outlines of AUX in generative grammar.

Variety of Languages and Typological Similarities

Language makes possible to exchange various ideas between human beings. It also makes possible to transmit these ideas from the older generation to the younger generation. No one knows for sure where or how language emerged, in spite of a great deal of efforts in exploring the matter. We do know, however, much about languages, the languages of today as well as the languages of earlier periods. The current number of languages over the world is estimated from three thousand to five thousand, or probably more. Quite a few languages are spoken by relatively a small number of people,² and besides many parts of the world are still not fully surveyed. While the speakers of Chinese outnumber those of English, Spanish, Russian, and Hindustani which are spoken by hundreds of millions of people, some of the tongues in Africa have less than one hundred

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− 145 −
speakers.

Linguists divide languages in the world into several major families, from a historical point of view. For example, most languages in Europe are thought to belong to one large family referred to as “the Indo-European Family of Languages.” The oldest language of this family, i.e. *Proto Indo-European*, is thought to have been spoken in a larger part of the world more than 4,500 years ago. As the following diagram indicates, English is one of the living descendants of the Proto Indo-European, which today has a great variety of dialects though. In spite of such varieties, English seems to have gained a status of *lingua franca*, just as Latin did in the era of the Roman Empire.

![Diagram of Indo-European languages](image-url)

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As D. Bolinger points out, it need hardly be said that languages should be related genetically, culturally, and typologically, i.e., they genetically have relationships with a certain common ancestor like family ties; they culturally relate one to another through direct or indirect contacts at a particular time at a particular place; and typologically they have the same patterning in word-order, without association with their origins. For example, one variety of English spoken in the U. S. referred to as American English, is thought to have a genetic relation to Dutch, since they are both direct descendants of West Germanic in the Indo-European family. The language at the same time, culturally relates to native tongues in the North American Continent, from which it borrowed a
Historical Outlines of AUX in Generative Grammar in the Light of Language Universals

plenty of words associated with native place names. On top of that, it could relate typologically even to Chinese, which has more resemblance than a cousin language, Latin does, in point of lack of inflections on each word and its dependency on word-order. What do you imagine about Rumanian as another example? It does not only genetically and typologically relate to other Romance languages, via their common ancestry of Vulgar Latin, but also culturally relates, to some extent typologically, to other Balkan languages, especially Slavonics which hemmed it around out of the rest of the Latin world for centuries.

D. Bolinger indicates such relationships, as follows: 4

Though genetic and cultural relationships tend to spell typological ones, it often happens that languages of the same family diverge so radically in the course of time that only the most careful analysis will demonstrate their kinship. The opposite happens too: languages unrelated genetically may "converge" to a high degree of similarity. Typological resemblance is what we look to for the traits that are universal to all humankind.

We see, hinted in this extract from Aspects of Language, how much emphasis is put on typological similarities among languages belonging to different groups defined from a comparative linguistic point of view.

**Historical Background of Universal Research**

Current researches in universals of human language can trace their history back to (1) achievements by Greenberg in the 1950s and the conference on language universals held in Dobbs Ferry, N. Y. in 1961; (2) generative innovations in linguistics by Chomsky and his school, as exemplified in the symposium on universals in linguistic theory held in Austin, Texas in 1967. These conferences were realization of two different research streams in the 1960s; one was oriented to typological analysis of cross-linguistic data, and the other to the theoretical approach to the description of universal grammar. The two fashions began to interact with each other in the 1970s, since then the research in universals has been broadly recongnized as one of the major concerns of language science. More discussion in detail are in the following section.

1. Two streams of research

During the decade of 1961-71, the different streams of universal research realized in the formation of the conferences mentioned above, flowed into separate directions. Greenberg's research went on with the pursuit of typological similarities, and achieved the compilation of Universals of Language. This Dobbs Ferry conference volume was widely read in Europe including Russia as well as in the U. S. Soviet linguists were so much interested in typological approaches that a conference on general topics on typology and universals in Moscow in 1966 had a great success. In 1967-76 the most remarkable project to pursue language universals was carried out under Greenberg's and Ferguson's
conduct, whose achievements were published in the form of *Universals of Human Language*, in four volumes.

The other stream of researches in language universals was the development of generative grammar, which was referred to as transformational generative grammar at that time, by Chomsky and his school. A list of scholars reminds us how the trend in generative approaches to language universals used to be in those days, which includes Chomsky and Halle (1968), Bach (1965), Ross (1969), Katz (1972), Jackendoff (1972), Fillmore (1968), etc. As C. Ferguson pointed out, "it was felt that the more important kind of research was to determine the form of grammars rather than merely to describe languages of correct surface characteristics of large samples of languages."11

2. Convergence of two streams

In the beginning of the 1970s, the typological stream from Dobbs Ferry and the generative stream from Austin came to have mutual relationships through several factors: (1) the fragmentation of transformationalists' approaches to language science, (2) the rapid expansion of transformational models in non-English-speaking world, (3) the renewed interest in diachronic syntax, associated with Greenberg's diachronic-synchronic universal analysis of word-order, e.g. Traugott (1972), Klima (1965), Lehmann (1970), and Givón (1973).15

It was E. Bach who mentioned the importance of Greenberg's models of language universals as a source of formal constraints on generative grammar, and devoted himself to describing "substantive universals in syntax."16

3. Current universals research

Research in language universals today has four aspects of themes: (1) the cross-linguistic archiving theme, (2) the typological theme, (3) diachronic processes in syntax, and (4) the connection with language acquisition. Especially concerning the first and the second themes, B. Comrie's research and formalization in grammar is a typical example as the publication of *Language Universals and Linguistic Typology: Syntax and Morphology* (1981), while on the last aspect is an expansion into socio-linguistics including pidginization and creolization all over the world.

**Transition of the Category AUX in Generative Grammar**

Over these three decades the issues of AUX have been in controversy in generative grammar. The appearance of the term AUX and its category, which in part represents the notion of auxiliaries in traditional grammar, was made in Chomsky's *Syntactic Structures* (1957). In the original transformational analysis of the English auxiliary, AUX was defined as one of the major elements constituting a sentence, as the following diagram indicates:
Historical Outlines of AUX in Generative Grammar in the Light of Language Universals

i. Verb → AUX + V
ii. V → hit, take, walk, read, write, &c.
iii. AUX → C (M) (have + en) (be + ing) (be + en)
iv. M → will, can, may, shall, must
ex.) The boy may have been writing a letter.

This diagram was revised in Aspects of the Theory of Syntax (1965), as follows:
AUX → Tense (Modal) (have + en) (be + ing)

The structural models of AUX mentioned above have two significant characteristics, i.e. (1) TENSE (or C) is the only obligatory element in the category AUX, while the other elements are all optional constituents, including Modals, Perfective marker (Have) and Progressive marker (Be); (2) each element is specifically arranged in order by the Phrase Structure rule (PS rule) in the direct way. This kind of proposal is referred to as "the Phrase Structure analysis" in sharp contrast to "the Main Verb analysis." Akmanian, et al. (1979) describes the properties of the PS analysis as follows:

Two fundamental features of the PS analysis are (a) a syntactic category AUX is proposed, which appears as a syntactic node in phrase markers, and (b) AUX consists of a collection of elements (which can be characterized notionally as tense, modality, and aspect) whose relative distribution (i.e. linear position in a string) is directly specified and constrained by the PS rule [AUX → Tense (Modal) (have + en) (be + ing)].
At this stage there arises a question: how do you explain the structure and mechanism of inverted sentences, in the framework of this kind of the PS rule? We need another formula in order to explain the following interrogative sentences:

ex. 1. May I come in now?
ex. 2. Have you finished writing your term paper?
ex. 3. Is she playing the piano in the hall?

\[
\text{Tense} \begin{cases} 
\text{Modal} \\
\text{have} \\
\text{be}
\end{cases}
\]

Culicover (1982\textsuperscript{2}) points out the necessity of a new assumption as follows: \textsuperscript{18}

A particularly elegant statement of Inversion is achieved given the assumption that the sequence of TENSE followed by the first member of the verbal sequence is in fact a single constituent of the sentence. Inversion can then be stated so as to apply to this constituent, and there is no need to specify the internal structure of the sequence moved by the transformation.

In the 1970s the PS analysis was modified and revised by Jackendoff (1972, 1977),\textsuperscript{19} Akmajan and Wasow (1975),\textsuperscript{20} Edmonds (1976),\textsuperscript{21} Culicover (1982\textsuperscript{2}), etc., into a renewed formula of AUX which consists of only two elements: Tense and Modal. In this stream, however, there was a divergence between attitudes towards setting Modal as an obligatory element of AUX, and setting Modal as an optional element of AUX.

1. Modal as obligatory

Culicover, Edmonds, and Akmajan & Wasow propose a revised diagram as follows:

i. S \rightarrow NP AUX VP
ii. AUX \rightarrow Tense M
iii. VP \rightarrow (have en) (be ing) V (NP)

What has to be noticed in this formula is the setting of transformational rules, i.e. (1) Do-Deletion Rule and (2) Do-Replacement Rule.

(1) Do-Deletion Rule

In the deep structure of a sentence which does not have a Modal on the surface, DO exists before it has got deleted in front of a verb, unless the stress is kept on DO.

ex. 1. *The princess did smile.
ex. 2. The princess smiled.
ex. 3. The princess DID smile.

We may generalize and formulate this rule as follows:

\[<\text{Do Deletion}>\]

<table>
<thead>
<tr>
<th>SD: X - do -</th>
<th>[+ V] - Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4</td>
<td></td>
</tr>
</tbody>
</table>

| SC: 1 \emptyset | 3 4   |

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- 150 -
Thus the formula above suggests the following deep structure of ex. 2 sentence:

```
S
  /\      /
 /NP/  / AUX  /VP/
   \    /      /
     Tense M      V
      Past  do  smile
```

(2) Do-Replacement Rule

If the existence of DO in the deep structure is presupposed, the aspectual elements of VERB, i.e. *have* and *be*, can take the place of DO.

\( <\text{Do Replacement} > \)

\[
\begin{align*}
SD &: X \rightarrow do \rightarrow \{\text{have}\} \rightarrow Y \\
1 &\quad 2 &\quad 3 &\quad 4 \\
SC &: 1 &\quad 3 &\quad \emptyset &\quad 4 
\end{align*}
\]

To take a simple example such as "The prince had left," we can illustrate its generative process as follows:

```
S
  /\      /
 /NP/  / AUX  /VP/
   \    /      /
     Tense M      V
      Past  do  leave
```

These transformational rules explain the reason why DO does not co-exist with *have* for perfect / *be* for progressive, though it must be noticed that there are different views on the existence of DO as AUX at the deep level.
2. Modal as optional

Jackendoff proposes another kind of revised PS rule of AUX, which defines Modal as an optional element, as follows:

i. \( S \rightarrow \text{NP AUX VP} \)

ii. \( \text{AUX} \rightarrow \text{Tense (Modal)} \)

iii. \( \text{VP} \rightarrow \text{(have-en) (be-ing) V (NP)} \)

We can represent this formula diagrammatically as follows:

In this formula DO is not presupposed in the base, thus another transformational rule must be required in order to insert DO into negative sentences and interrogative sentences. The transformational rule is referred to as “Have-Be Raising.”

\(<\text{Have-Be Raising}>\)

\[ \begin{align*}
\text{SD} & : X \rightarrow \text{Tense}  \rightarrow \{\text{have} \} \rightarrow Y \\
1 & \hspace{1cm} 2 \hspace{1cm} 3 \hspace{1cm} 4 \\
\text{SC} & : 1 \hspace{1cm} 2 + 3 \hspace{1cm} 4 \\
\end{align*} \]

To take the same example as in “Do-Replacement Rule,” we can illustrate the transition of base structures as follows:
Historical Outlines of AUX in Generative Grammar in the Light of Language Universals

All these things make it clear that the characteristics of "the Phrase Structure analysis" of the category AUX such as Culicover, Edmonds, Akmajian & Wasow, and Jackendoff, are summarized in three points: (i) AUX consists of two elements, Tense and Modal, (ii) have as an aspectual marker and be as a progressive marker can raise themselves up into AUX, and (iii) DO does not co-exist with have / be, because of its property as a constituent of AUX. Through the PS analysis we can define AUX as one of the grammatical categories, which constitutes an adequate sentence of other languages as well as English. Akmajian, et al. (1979) lays a special emphasis on universality of AUX as follows:  

AUX is a category — i.e. distinct in its syntactic behavior from the behavior of other syntactic categories — labeling a constituent that includes elements expressing the notional categories of Tense and/or Modality.

Insofar we have drawn a picture of the PS analysis, which supposes AUX as a syntactic category, let us consider the other treatment of auxiliaries in generative grammar, referred to as "the Main Verb analysis."

As far as following the PS analysis, we can not accept similarities between verbs and auxiliaries, because they belong to the different category respectively. On top of that, in the formula \( \text{[AUX} \rightarrow \text{Tense (Modal) (have-en) (be-ing)]} \), the arrangement of elements are linear and horizontal, far from hierarchical and vertical. Akmajian, et al. (1979) refers to the hierarchical approach to AUX as the Main Verb analysis, and negatively describes it as follows:

In the MV analysis, originally proposed by Ross (1967), there is no syntactic category AUX, but rather, the members of the auxiliary in English are taken to be main verbs that take full sentential complements. The complex deep structures required by this analysis undergo certain transformations (notably, raising rules) that collapse the complex embeddings into simple surface structures; furthur, the distribution of the auxiliary elements is said to be governed not by a PS rule, but rather by supposedly independently necessary constraints holding between main verbs and their sentential complements.
Ross (1969) illustrates the constituent structure of a sentence as follows:

ex.) Mary might have been singing.

This diagram tells us that the Main Verb analysis has significant features differentiated from the Phrase Structure analysis in three points: (i) AUX is not an independent category in this framework, (ii) each auxiliary must have S or VP as its complementary part, and (iii) the way each auxiliary is arranged in order and related to one another, is not governed by PS rules but by constraints between a verb and its complement. At the extreme point of the scale of the Main Verb analysis, McCawley (1971) proposes an eccentric refinement of Ross's analysis, indicating that "tenses are not features but are themselves underlying verbs and that all occurrences of the auxiliary have are underlying past tenses," as follows:

ex.) John had been smoking pot.
McCawley observes four aspects of distinctive properties to support his proposal as follows:\textsuperscript{26}

1. Tense can only occur first, since tense in any other position is either deleted or turned into \textit{have}.
2. Modals can be preceded only by tense because of their defective morphology: if modals appeared anywhere else they would have to be in an infinitive or participial form, and English modals do not have such forms.
3. Progressive \textit{be} must occur last because of the constraint that the topmost verb of its complement must be nonstatic.
4. There could not be more than one \textit{have} since any \textit{have's} in a structure not already excluded by (2) or (3) would have to be contiguous and since all but one of a string of contiguous \textit{have's} would be deleted.

It is true that McCawley's observation is a fervent attempt in the framework of the Main Verb analysis, but we should not overlook a number of arguments such as Araki, et al. (1977)\textsuperscript{27} and Sawada (1993).\textsuperscript{28}

The category AUX, which has been paid much attention to and modified in the earlier framework of generative grammar, changes its manner along with the transition of generative theory in the 1980s. In the theory of Core Grammar, which was advocated in Chomsky's \textit{Lectures on Government and Binding} (1982)\textsuperscript{2}, the term INFL (=inflection) instead of AUX is coined and defined as one of the crucial elements in the GB theory.\textsuperscript{29}
S → NP  INFL  VP

S

NP  INFL  VP

INFL → { + Tense [ARG] (Modals) }^{30}
to

In the following chapters in Part II, we shall discuss this renewed model in detail, and describe the syntactic characteristics of the category AUX and its internal structure, with special reference to language universals.

To be CONTINUED.

NOTES

1. The present writer's thesis was presented to Kansai University of Foreign Studies in 1981, which has been unpublished since then.
2. For example, Celtic. "In the 18th century, many Gaels emigrated to Cape Breton Island, Nova Scotia; there were an estimated 30,000 speakers of Cape Breton Gaelic in the 1930s, but only a few are left today. In Europe, the most noticeable modern characteristic of this language family is its dramatic decline, under the influence of its powerful linguistic neighbours, English and French. But equally dramatic is the 20th-century revival of interest in Celtic languages, as symbols of nationalistic unity, and as keys to earlier periods of cultural and literary brilliance." (The Cambridge Encyclopedia of Language, pp. 302-303.)
4. ibid., p. 13.