

Review of Language Classifications: Observations and Explanations

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Abstract

The objective of this article is to review the history of different approaches to language classification. For classifying languages, early linguists have inductively observed the surface structures of existing languages to find common and different linguistic properties. Inductive classifications started with a historical approach (e.g., family tree), which was followed by a geographical approach (e.g., wave theory). Later, Greenberg's (1963) findings of "language universals" based on a typological approach brought a significant impact, and Greenbergian typology became mainstream for language classification studies. In contrast to the above inductive observations, Chomsky (1980; 1981) and his Principles and Parameters Theory offered a deductive account for Greenbergian findings. According to the theory, language diversity is a reflection of the binary settings of parameters. Further, a functionalist approach filled the gap that the Chomskyan theory did not explain; functionality affects the distributions of language types, with preferences for some parameter settings over other settings. Overall, this article demonstrates that explanations for language differences have developed from inductive observations to formalist approach, and then to functionalist approaches in order for inductive observations and formalist explanations to be compatible.

Keywords — *historical approach, geographical approach, typology, principles and parameters theory, functionality*

I. INTRODUCTION

The objective of this article is to review the history of different approaches that have been taken in studies of language classification. There have been two main methodological approaches to classifying languages: inductive and deductive approaches (Comrie, 1989). The inductive approach, which was most significantly carried out by Joseph Greenberg, observes a wide variety of languages to find common and different properties among them. The deductive approach, which was mostly led by Noam Chomsky, explains language variations based on formal theories of language structures. Language classification started with the inductive classification, of which, according to Greenberg (1968), there are three types: historical classification, geographical classification,

and typological classification. Historical classification groups languages depending on the similarities that they inherited from common ancestors. Geographical classification groups languages according to the similarities that they gained from areal contact. Typological classification groups languages based on universal tendencies that groups of languages share. After Greenberg's typological study in 1963, the pursuit of universal properties that group languages became the goal of language classification. While the classifications above were based on the inductive observations of languages, relatively modern linguists have attempted to provide deductive explanations for the inductive findings. According to Holsberg (2016), there are two types of deductive approaches for analysing language differences: the Chomskyan formalist approach and the functionalist approach. Chomsky's Principles and Parameters Theory (1980; 1981) suggests that all languages share universal linguistic principles and that linguistic diversity is the result of binary settings of different parameters that are applied to the universal principle. However, a possible limitation of the Chomskyan explanation is that it does not explain why a setting of a parameter is greatly preferred to the other setting of the same parameter, e.g., 90% of languages follow one setting and 10% the other. More recent functionalist linguists offer an account to fill in the gap of Chomskyan explanation for the uneven distributions of parameter-settings. That is, a parameter-setting is preferred over the other one because one setting is more functional than the other. The functionalist approach links Greenbergian findings and Chomskyan theory. The following chapters review the above different approaches to language classifications.

II. HISTORICAL CLASSIFICATION

Language classifications have developed based on observable common properties that occur cross-linguistically. The classifications started in the eighteenth century when William Jones and others first separated languages into several language families (Campbell, 2006). The historical approach mostly focused on the diachronic phonological changes. Linguists found regularity in the phonological differences between languages and reconstructed the linguistic traits by figuring out what properties languages inherited from their ancestors. With this approach, language classification was illustrated in the form of a family tree. The tree

illustrated below is an example from August Schleicher (1869, p. 71). The family tree has been greatly extended by later linguists to include many more languages.

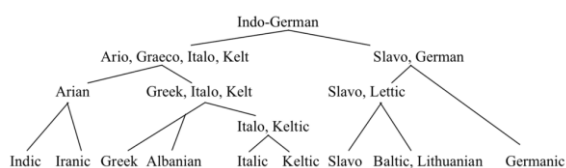


Fig 1: Schleicher's family tree

However, one limitation of the family-tree analysis is that it cannot explain how two granddaughter languages from different branches share common properties through borrowing. Actually, linguistic changes often present both break-up and convergence. There have been many cases in which daughter languages lose or merge formerly contrasting sounds or eliminate earlier alternations through analogy. In short, the family tree model cannot express the shared property of the language D and E in the diagram below.

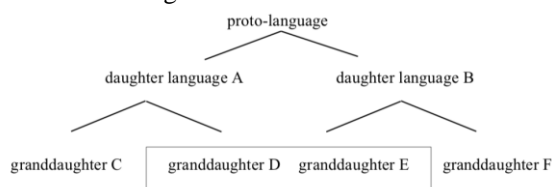
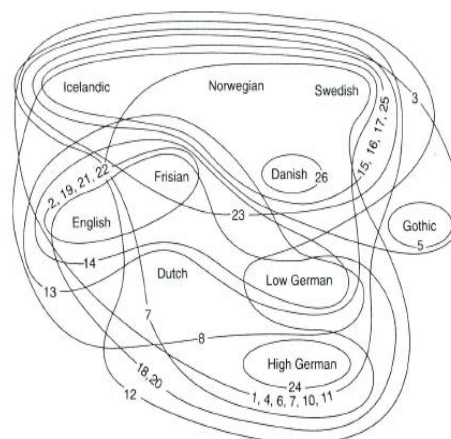


Fig 2: Similarity that family tree cannot express

III. GEOGRAPHICAL CLASSIFICATIONS

As an alternative of the family tree model, dialectologists and areal linguists suggested geographical classification of languages. For example, Hugo Shuchardt and Johannes Schmidt developed the wave theory in an attempt to deal with linguistic changes due to contact among languages (Trask, 2002). The wave theory suggests that linguistic changes spread outward concentrically like waves. The wave-like spreads are expressed by isoglosses on a map, and the isoglosses capture the properties that are shared between the languages even if they are from different mother languages. An example is shown below in Figure 3.

A well-known language group that shares properties with its geographic contacts is Balkan Sprachbund. The languages in this group are spoken in the Balkan Peninsula, such as Albanian, Bulgarian and Romanian, and many of them utilize suffixes on nouns to mark definiteness. This method of using suffixes is not a trait among mother languages of Albanian, Bulgarian or Romanian origins. This is an example of what the family tree model cannot express but geographic classification can.



- 1 /ae:/ backed to /a:/
- 2 /a:/ from earlier /ae:/ restored
- 3 'sharpening'
- 4 /z/ > /r/
- 5 /l/ > /θl/
- 6 masculine singular -s lost
- 7 masculine plural -s lost
- 8 reflexive pronoun lost
- 9 reduplicating verbs lost
- 10 inflected passive lost
- 11 umlaut introduced
- 12 dental fricatives lost
- 13 /n/ lost before /s/
- 14 /n/ lost before any voiceless fricative
- 15 extensive assimilation of consonant clusters
- 16 suffixed definite article introduced
- 17 mediopassive introduced
- 18 verbal infinitive becomes a noun
- 19 vowel 'breaking' introduced
- 20 consonant gemination in certain circumstances
- 21 palatalization and assibilation of /k, g/ before front vowels
- 22 metathesis of /r/
- 23 final /-n/ lost in inflections
- 24 High German consonant shift
- 25 pitch accent introduced
- 26 pitch accent converted to glottalization

Fig 3: A wave diagram of the Germanic family (Trask, 2002, p. 230)

A problem of geographical classification is that it explains only the geographic distribution of the common properties among languages; it cannot explain how it is possible for a language far away from the Balkan Peninsula that is not considered to be a member of Balkan Sprachbund, to share some common linguistic properties with Balkan Sprachbund.

IV. TYPOLOGICAL CLASSIFICATION

A. Morphological Typology

Different from historical and geographical classifications, typological classification analyses the forms of sounds, morphemes, syntax, or discourse structure, of which languages are composed. According to Whaley (1997), typology is defined as "the classification of languages or components of languages based on shared formal characteristics" (Whaley, 1997, p. 7). Typology started with the analysis of morphology in the nineteenth century. Friedrich von Schlegel first presented the distinction between "inflectional", "affixal", and "no-structure"

languages (Whaley, 1997, p. 20). Wilhelm von Humboldt succeeded Schlegel’s work, and Schleicher and Sapir developed their analyses. According to Schleicher, languages are classified into the following three categories: fusional (inflectional) languages, agglutinative languages, and isolating languages. In fusional languages, morphemes are incorporated into words and are difficult to segment (e.g. Latin, Greek, Arabic, Russian, etc.). In agglutinative languages, morphemes are attached to words in the form of affixes (e.g. Japanese, Korean, Turkish, etc.). In isolating languages, few words change their form for inflection or with affixation (e.g. Chinese, Vietnamese, etc.). Examples are shown in the below table. In the examples, while Turkish inflections appear systematic, Russian inflections are inconsistent and its morphemes are difficult to recognize. On the other hand, in Vietnamese, where the singular and plural forms are identical (*tôi*), plurality is expressed by an independent word (*chúng*), and these forms do not change depending on grammatical case.

TABLE I
Morphological Differences (Comrie, 1989, p .43-44)

Types	Case	Singular	Plural
Fusional e.g., Russian <i>stol</i> ‘table’ <i>lipa</i> ‘linden’	Nom.	<i>stol</i>	<i>stol-y</i>
	Gen.	<i>lip-a</i>	<i>lip-y</i>
	Acc.	<i>stol-a</i>	<i>stol-ov</i>
	Dat.	<i>lip-y</i>	<i>lip</i>
Agglutinative e.g., Turkish <i>adam</i> ‘man’	Nom.	<i>stol</i>	<i>stol-y</i>
	Gen.	<i>lip-u</i>	<i>lip-y</i>
	Acc.	<i>stol-u</i>	<i>stol-am</i>
	Dat.	<i>lip-e</i>	<i>lip-am</i>
Isolating e.g., Vietnamese <i>tôi</i> ‘I’	Nom.	<i>adam</i>	<i>adam-lar</i>
	Gen.	<i>adam-m</i>	<i>adam-lar-m</i>
	Acc.	<i>adam-ı</i>	<i>adam-lar-ı</i>
	Dat.	<i>adam-a</i>	<i>adam-lar-a</i>
Isolating e.g., Vietnamese <i>tôi</i> ‘I’	Nom.	<i>tôi</i>	<i>chúng tôi</i>
	Gen.	<i>tôi</i>	<i>chúng tôi</i>
	Acc.	<i>tôi</i>	<i>chúng tôi</i>
	Dat.	<i>tôi</i>	<i>chúng tôi</i>

Sapir (1921) also suggested the categories of polysynthetic languages and incorporating languages, which are extraordinarily fusional. Sapir explains;

The elaboration of the word is extreme. Concepts which we should never dream of treating in a subordinate fashion are symbolized by derivational affixes (Sapir, 1921, pp. 135-136).

The difference between polysynthetic languages and incorporating languages is that while polysynthetic languages allow the incorporation of many grammatical and lexical morphemes, incorporating languages allow for the incorporation of lexical morphemes only. In polysynthetic and incorporating languages, one word could be extremely long, as

shown in the below example from Chukchi, a native Siberian language (Bogoras, 1922, p. 833).

- (1) *tə -meyŋə -levtə -pəyt. -ərkən*
1sing -great -head -ache -imperfect
‘I have a fierce headache.’

The above word incorporates three lexical morphemes, *meyŋ* ‘great, big,’ *levt* ‘head,’ and *pəyt* ‘ache’, in addition to grammatical morphemes *t-* (first person singular) and *rkən* (imperfect aspect).

Building upon Schleicher and Sapir’s analyses, later linguists such as Comrie (1989) utilized two-way morphological analysis based on the index of synthesis (the number of morphemes) and the index of fusion (how easily segmentable the morphemes are). The degree of synthesis is highest in synthetic languages (which are typically agglutinative languages) and lowest in analytical languages (which are typically isolating languages). The degree of fusion is lowest in agglutinative languages and highest in fusional (inflectional) languages.

Schleicher proposed that languages diachronically change from isolating to agglutinative, and from agglutinative to fusional as their sophistication increases. However, linguists later discovered cases in which fusional (inflectional) languages had become isolating languages, as depicted in the figure below. For example, English is a fusional language, but it also behaves like an isolating language.

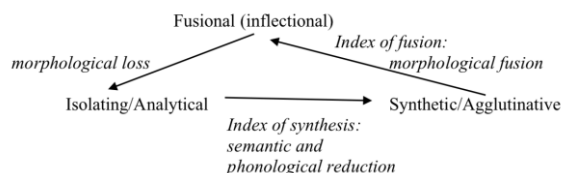


Fig 4: Morphological changes (Whaley 1997, p.138)

Also, it has been found that isolating languages have rigid word order. This is possibly because isolating languages have to rely on word order to indicate the grammatical roles such as subjects or objects since they do not have morphological marking to indicate the relationship between a verb and its dependents (Whaley, 1997).

B. Greenberg’s Syntactic Typology and Language Universals

In the mid-twentieth century, Joseph Greenberg (1963) analysed linguistic typology in terms of syntax to find universal properties in the languages. In his study, Greenberg generalized the word orders in languages, and he found “some universals of language with special reference to the order of meaningful elements” (Greenberg, 1963, p.58). Specifically, he categorized 30 languages based on the order of subject (S), object (O) and verb

(V), pre-/postpositions and the relevant nouns, adjectives and modified nouns, nouns in the genitive case and the modified nouns, and so forth. Greenberg eventually found 45 universal principles. More than half of the universals concerned word order, and many of the morphological universals concerned the affix ordering in its relation to syntax. The first universal that Greenberg presented was that the dominant order of subject and object is SO, and thus SOV, SVO and VSO are the three major word orders of S, V and O. Although Greenberg observed only 30 languages, his findings regarding the order of S, V and O are confirmed by more recent databases such as Matsumoto’s (2006) one based on the observation of approximately 1570 languages.

TABLE II
Classifications Based on Word-orders (Matsumoto 2006, p.211)

Word-order	Number of Languages	Percentage
SOV	771	49.3%
SVO	547	35.0%
VSO	175	11.2%
VOS	44	2.8%
OVS	16	1.0%
OSV	10	0.6%

One of the most significant findings of Greenberg’s study is that there is a strong consistency in the order of heads and dependencies, which are either head-initial or head-final. As Greenberg’s (1963) second, fourth, and seventeenth universals describe, when a verb (V) precedes its object (O) in a verb phrase, it almost always utilizes prepositions (PR), and the nouns in the genitive case (G) as well as adjectives (A) follow the modified noun (N), i.e., VO/PR/NG/NA. On the other hand, when a verb (V) follows its object (O) in a verb phrase, it almost always utilizes postpositions (PO), and the nouns in the genitive case (G) as well as adjectives (A) precede the modified noun (N), i.e., OV/PO/GN/AN. The former is the head-initial language, and the latter is the head-final language. For example, Chinese and Turkish have firm head-final or “ascending” constructions, while English and French have head-initial or “descending” constructions, in Weil’s (1877, p. 59) terms.

Greenberg’s study significantly impacted the studies of language classifications and gave rise to the modern typological study of languages based on inductive and statistical observation. Although the notion of linguistic universals had been previously proposed in the seventeenth century (Padley, 1976), after Greenberg, it became the main interest of language classification to find universal rules that explain languages’ common properties and differences through typological analysis.

It should be noted that Greenberg’s analysis was, as mentioned earlier, based on the observations of only 30 languages. The universals that he found are not absolutely true to all the languages, as Greenberg (1963) himself frequently states that his findings are “general tendency”. Many languages that Greenberg did not analyse are inconsistent with his universals. For example, some different Semitic languages in Ethiopia show coexistence of postpositions and prepositions, and the presence of ambipositions. Also, in a Guatemalan language, the order of VSO and adjective-noun order coexist, which is incompatible with Greenberg’s (1963) third universal. Dryer (1988) further observed that OV order is strongly correlated with adjective-noun order in Eurasia, but OV order is as strongly correlated with noun-adjective order outside Eurasia, exhibiting an inconsistency with Greenberg. Moreover, Hawkins (1983) found that nearly one-third of SVO languages in his database utilize postpositions. Matsumoto (2006, p. 214) also shows some inconsistency in head directionality. According to him, 75% of the languages in his database belong to one of the four combinations of heads and dependencies as shown in (2).

- (2) a. SOV/PO/GN/AN (262 languages)
- b. SOV/PO/GN/NA (231 languages)
- c. SVO/PR/NG/NA (323 languages)
- d. VSO/PR/NG/NA (95 languages)

One of the four dominant types, (2b), is head-final in the orders of OV, PO and GN, but shows head-initial order in NA. For this inconsistency in head directionality, Matsumoto’s explanation is that NA is closer to the base-structure in the framework of the early generative grammar. For example, ‘the high mountain’ is derived from the base-structure, ‘the mountain is high,’ and the NA order follows this order. According to this account, the preference for generative base-structure overrides the consistency of head directionality.

A more general account offered by Lehmann (1973) hypothesizes that the languages that show inconsistencies in the order of heads and dependencies are in the process of diachronic change. For example, English used to be an OV language as Fries (1940) observed; its diachronic shift toward VO is shown below.

TABLE III
Word-order Change in English (Fries, 1940, p. 201)

Word-order	c. 1000	c. 1200	c. 1300	c. 1400	c. 1500
OV	52.5%	53.7%	40.0%	14.3%	1.9%
VO	47.5%	46.3%	60.6%	85.7%	98.1%

Some languages that are inconsistent in the head directionality are possibly at an extreme point of

historical shift toward a different structure from their original one.

C. Extensions of Greenberg’s Typology

After Greenberg, several linguists found more typological generalizations and additions to Greenberg’s study. For example, Lehmann (1973) maintained that classification based only on verb and object is more significant than that based on subject, verb and object because firmly consistent OV or VO languages often do not require subject in their sentences. According to Lehmann, V and O are concomitants of each other, and a concomitant places its modifier and paring concomitant on different sides. Examples are shown below.

(3)
 a. Japanese (OV)
[haha-ga tsukutta] gohan-o taberu
 [mother made] meal-ACC eat
 (modifier of ‘meal’) (concomitant) (concomitant)
 ‘(I) eat a meal that mother made.’

b. English (VO)
I eat a meal [that mother made].
 (concomitant) (concomitant) (modifier of ‘meal’)

Also, as a relation between Greenberg’s syntactic typology and the earlier morphological typology, Lehmann found that VO languages tend to be fusional (inflectional) while OV languages tend to be agglutinative. Also, the morphemes that are attached to a verb tend to be placed before verb roots in VO languages and after verb roots in OV languages. In addition, in VO languages, question sentences are formed by placing a question-marking entity (such as wh-words in English) at the beginning of sentences, while in OV language, questions are formed by placing a question-marking entity at the end of sentences (such as the question marker *ka* in Japanese).

Vennemann (1974) explained that one of the constitutions that is paired with another one in a certain order is the “operator”, and the other one is the “operated”. He listed the operators and the operated as shown below.

(4)	
a. OPERATOR	b. OPERATED
object	verb
adjective	noun
genitive	noun
relative clause	noun
noun phrase	adposition
standard of comparison	comparative
adjective	

According to Vennemann, head-initial languages are equal to the operated-operator languages, and head-final languages are the operator-operated languages.

Hawkins (1983) dealt with SOV and VSO order as trustful predictors of the order between adjectives and nouns and between genitives and nouns, similar to Greenberg. Also, they are predicted by whether a language utilizes preposition or postposition. Refer to (6) below.

- (5) SOV → (AN → GN)
- VSO → (NA → NG)
- PostPo → (AN → GN)
- PrePo → (NA → NG)

Dryer (1992) suggested the Branching Direction Theory, which explains that pairs of nonphrasal categories and phrasal categories are consistently right branching or left branching, as shown below.

Branching Direction Theory (BDT): Verb patterners are nonphrasal (nonbranching) categories, and object patterners are phrasal (branching) categories. That is, a pair of elements X and Y will employ the order XY significantly more often among VO languages than among OV languages if and only if X is a nonphrasal category and Y is a phrasal category. (Dryer, 1992, p. 89)

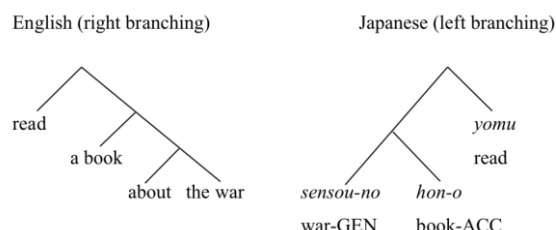


Fig 5: Left branching (in English) and right branching (in Japanese)

This theory explains what Greenberg (1963), Lehmann (1973), Vennemann (1974) and Hawkins (1983) could not, regarding the order of adjectives and modified nouns. Because an adjective that precedes a noun cannot take a phrasal complement, adjectives are not “phrasal (branching) categories” or “Y”, and can be placed before the modified noun even in a head-initial language.

D. Typology Other Than Word Order

In the 1970s and 1980s, a number of new methods of classifying languages was added in the typology. For example, in observing languages that do not require subjects, Perlmutter (1971) classified languages into two groups depending on whether the language allows sentences without subjects or not. Languages that must have a subject in a sentence include English, French, German and so forth.

Languages that allow null subjects include Spanish, Italian, and Arabic.

While Greenberg assumed that sentence-structure is relevant to subject, object and verb, Li and Thompson (1976) suggested a category of “topic” based on the observation that many East Asian languages have topic-noun phrases that cannot be grammatically categorized as subject or object. In their analysis, a sentence consists of topic and comment; the topic is syntactically independent of the rest of the sentence, and the comment contains a complete clause. Refer to the example in Japanese below.

- (6) *Zoo-wa hana-ga nagai.*
 Elephant-TOP nose-NOM long
 (Topic) (Comment)
 ‘As for elephants, their noses are long.’

Based on the analysis, Li and Thompson suggested classifying languages into the following four groups.

- (7)
 a. Languages that do not have the topic but have the subject as a grammatical category (e.g. English)
 b. Languages that do not have the subject but have the topic as a grammatical category (e.g. Lisu)
 c. Languages that have both the topic and subject as grammatical categories (e.g. Japanese)
 d. Languages that have neither the topic nor subject as a grammatical category (e.g. Filipino)

Li and Thompson also found that the topic tends to be positioned at the beginning of sentences. The sentence-initial placement of a topic explains Greenberg’s finding that the subject is positioned at the beginning of sentences. In a language that does not have a category of the topic, the subject is the topic or theme of the whole sentence in most cases. Comrie (1989) states that the subject is generally the agent and topic, and Li and Thompson state that the subject in languages that do not have a category of the topic, such as English, is a grammaticalized form of the topic. Even the object sometimes moves to the front to become the subject when it is the topic/theme of the sentence. This occurs typically by passivization, which Keenan calls “foreground operation” (Keenan, 1985).

Nichols (1986) found that some languages add case markers to dependencies, which she called dependent-marking languages, and other languages add case markers to heads, which she called head-marking languages. For example, Japanese is a dependent-marking language, and Hungarian is a head-marking language, as shown in the examples below.

- (8) ‘the man’s house’ in:
 a. Japanese:
otoko-nouchi

- man-GEN house
 b. Hungarian (Nichols, 1986, p. 57):
az ember ház-a
 the.man house-3sgGEN

Including the dominant two types of case-markings above, Nichols presented the four categories below that classify case-marking systems.

- (9)
 a. Head-marking: the predominate strategy of indicating dependency is to mark the head
 b. Dependent-marking: the predominate strategy of indicating dependency is to mark the dependent
 c. Double-marking: a significant number of constructions mark both head and dependent
 d. Some languages display equivalent numbers of head-marking and dependent-marking patterns

Nichols also found that languages that utilize case marking allow more freedom in the order of subject, object, and verb.

Dixon (1979) classified languages into nominative-accusative languages and absolutive-ergative languages, which is a morphosyntactic classification. Those two types of languages deal with the subject of intransitive verbs, subject of transitive verbs, and object of transitive verbs in different ways. The nominative-accusative languages (such as Japanese, Turkish) put the subject of transitive verbs and the subject of intransitive verbs in the same category as the “subject” with the nominative case. The subject is usually the “do-er” and the object is “do-ee” (Ibrahim, 2015). On the other hand, absolutive-ergative languages (such as Dyirbal, Greenlandic) put the object (“do-ee”) of transitive verbs and subject (“do-er”) of intransitive verbs in the same group as the absolutive case, as shown below.

- (10)
 a. Nominative-Accusative: Japanese:

Haha-ga kaetta.
 mother-NOM returned
 ‘Mother returned.’

Haha-ga chichi-o mita.
 mother-NOM father-ACC saw
 ‘Mother saw father.’

- b. Absolutive-Ergative: Dyirbal (Dixon, 1979, p. 61):

yabu-Ø banaga-nu.
 mother-ABS returned
 ‘Mother returned.’

numa-Ø yabu-ngu bura-n.
 father-ABS mother-ERG saw
 ‘Mother saw father.’

(As in many other absolutive-ergative languages, in Dyirbal the absolutive case is phonologically null.)

The finding of absolutive-ergative languages led to the realization of the discrepancy between grammatical relations and the disagreement of “subject-hood” between languages.

There are three other systems for dealing with the subjects of intransitive verbs, and the subjects and objects of transitive verbs. The tripartite system marks these three differently, while the accusative-focus system only marks the subjects of transitive verbs. The neutral system does not mark any of the three. Languages that utilize those systems are rare for functional reasons: tripartite systems utilize redundant markings, which is not economical, and accusative-focus and neutral systems are unclear in indicating the grammatical roles, which would put a heavy burden on the parsers of the languages.

V. CHOMSKYAN FORMALIST APPROACH FOR LANGUAGE UNIVERSAL

A. The Principles and Parameters Theory

As mentioned in the introduction, there are two major methodological approaches in language classifications, inductive and deductive approaches (Comrie, 1989). Those typological analyses in the previous sections were based on the inductive observations of a wide range of languages, as seen in the Greenberg’s work. On the other hand, the Chomskyan deductive approach attempts to provide formal explanations for Greenbergian typologists’ observational findings because, in Greenberg’s study, “attention is restricted to surface structures”, and “the most that can be expected is the discovery of statistical tendencies” (Chomsky, 1965, p. 118).

Noam Chomsky applies a deductive approach with his idea of Universal Grammar (UG) in the field of syntax. In his approach, all the languages are principally the same, and the differences of languages result from different settings of parameters that are applied to the universal principles.

That is, the systems that are now being investigated by a number of linguists do have a deductive structure that permits a range of empirical phenomena to be derived from some simple and I think rather natural principles, and they also have the property that small changes in the parameters in some of the general principles lead to quite different languages. (Chomsky, 1980, p. 68)

What we expect to find, then, is a highly structured theory of UG based on a number of fundamental principles... with parameters that have to be fixed by experience. ...the languages that are determined by fixing their values one

way or another will appear to be quite diverse, since the consequences of one set of choices may be very different from the consequences of another set... (Chomsky, 1981, pp. 3-4)

To the Chomskyans, Greenberg’s universals and findings that are inductively drawn from observation are considered to be reflections of the universal systematicity and binary setting of parameters that are drawn from the deductive theory.

...language differences and typology should be reducible to choice of values of parameters (Chomsky, 1995, p. 6).

The work of Greenberg has been particularly instructive and influential... These universals are probably descriptive generalizations that should be derived from principles of UG... (Chomsky, 1998, p. 33).

For the Chomskyans, Greenbergians’ typology cannot be a theory by itself and they do not have any theoretical or methodological significance. It rather should be accommodated in a separate theory and presuppose the theory. In fact, languages’ consistent head directionality that Greenberg found is compatible with the Chomskyan explanation of parameter-setting. The consistency of the order of the head and dependencies reflects the binary setting of “head directionality parameter”. That is, as Hawkins (1983) explained, explainable by the X-bar theory (Chomsky, 1970) as depicted below.

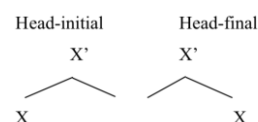


Fig 6: Head-initial and head-final

Also, as Matsumoto (2006) explains, the inductive finding that V and O are adjacent to each other in most languages confirms Chomskyan formalists’ Government and Binding Theory, which formalizes the phrase structure rules (as $VP \rightarrow V; NP$).

B. Baker’s Language Tree Based on Parameters

An example of deductive approaches to classify languages is Baker’s (2001) analysis, which illustrates languages’ distributions utilizing eleven parameters, including Sapir’s category of polysynthetic languages, Greenberg’s finding of head directionality, Perlmutter’s classification of null subject languages and non-null subject languages, Li and Thompson’s category of topic, and Dixon’s finding about absolutive-ergative languages. The eleven parameters and Baker’s tree are shown in (12) and Figure 7 respectively.

(11) Parameters for Baker's tree (2001, pp. 164-183)

a. Polysynthesis parameter (yes/no):

Verbs must include some expression of each of the main participants in the event described by the verb (the subject, object, and indirect object). e.g., Mohawk:

Sak shako-nuhwe's ne
owaira'a
Sak1 he1-likes-her2 the baby2
'Sak likes the baby.'

b. Adjective neutralization parameter (verb/noun):

Adjectives are treated as a kind of verb, or as a kind of noun.

e.g., Mayali: *Kandiwo mankuyeng!*
You-give long
'Give me long!'

c. Extended polysynthesis parameter (yes/no):

(i) Optional polysynthesis: Any participants of an event may be expressed on the verb (e.g. Chichewa, Slave)

(ii) Not polysynthesis: No participant of an event is expressed on the verb (e.g. English, Japanese)

d. Head directionality parameter (first, initial / last, final):

Heads follow phrases in forming larger phrases (e.g. Japanese), or heads precede phrases in forming larger phrases (e.g. English)

e.g., Japanese (head-final):

Object-Verb, Noun-Postposition

e.g., English (head-initial):

Verb-Object, Preposition-Noun

e. Ergative case parameter (accusative/ergative)

The case marker on all subjects is the same (e.g. Japanese, Turkish), or the case marker on the subject of an intransitive verb is the same as the case marker on the object of a transitive verb (e.g. Greenlandic)

f. Topic prominent parameter (yes/no):

A sentence may be made up of an initial noun phrase (the topic) and a complete clause that is understood as a comment on that topic (e.g. Chinese).

g. Subject side parameter (beginning/end):

Subjects are positioned at the beginning (e.g. English) or end of clauses (e.g. Malagasy).

h. Verb attraction parameter (yes/no):

Tense auxiliaries attract the verb to their position (e.g. French), or verbs attract tense auxiliaries to their position (e.g. English).

e.g., English:

John often kisses Mary.

e.g., French:

Jean embrasse souvent Marie.
Jean kisses often Marie

i. Serial verb parameter (yes/no):

Only one verb can be contained in each verb phrase (e.g. English), or more than one verb can be contained in a single verb phrase (e.g. Thai, Edo).

e.g., Edo:

Ozo gha le evbare khien.

Ozo will cook food sell

'Ozo will cook the food and sell it.'

j. Subject placement parameter (low/high)

The subject of a clause is merged with the verb phrase (e.g. Welsh), or with the auxiliary phrase (e.g. English).

e.g., English:

[The man [will [buy a car]]].

e.g., Welsh:

[naeth(AUX) [y dyn (S) [brynu car]]].

-ed the man buy a car

k. Null subject parameter:

Every tensed clause must have an overt subject noun phrase (e.g. English, French, German), or does not need to (e.g. Italian, Spanish).

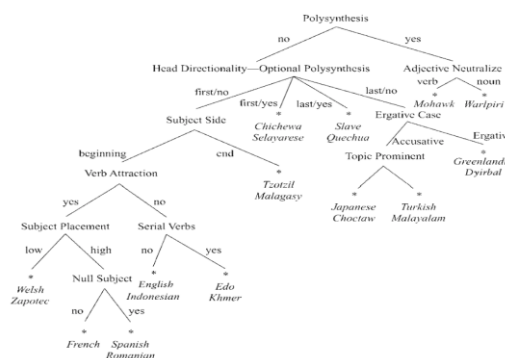


Fig 7: Baker's tree (2001, p. 183)

The tree looks similar to Schleicher's historical family tree, but Baker's tree is constructed with the syntactic and morphological differences between languages, making it different from Schleicher's. Baker ranked the parameters based on the principle that, "Parameter X ranks higher than parameter Y if and only if Y produces a difference in one type of language defined by X, but not in the other" (Baker, 2001, p. 163). Baker's tree is an attempt to express the systematicity in language distributions based on parameter-settings.

VI. FUNCTIONALIST APPROACH TO LANGUAGE DISTRIBUTIONS

A. Uneven Parameter Settings

According to the Chomskyan deductive approach, the actual data that is found through the

inductive observation such as Greenberg's study should be reflections of the Chomskyan Principles and Parameters Theory, as mentioned. Comrie (1989) and Pinker (1994) also maintain that the principles drawn through the deductive approach must be evidently confirmed by the inductive approach and data.

A possible remaining problem in the Principles and Parameters Theory may be uneven distributions of parameter-settings. That is, if languages differ because of the binary parameter-settings, "we expect roughly equal numbers of [A]-type and [B]-type languages" (Baker, 2001, p. 134), i.e., a parameter should divide languages approximately into halves, like head and tail of a coin flip. However, as evident in Greenbergian observations, parameters seem to be applied to languages in a significantly uneven way: for their binary settings, a setting is applied to a great number of languages while the other setting is applied to only a small number of languages. For example, in reference to Baker's (13i) null subject parameter, there are quite a small number of existing languages that obligatorily require overt subjects (e.g. English, French) (Matsumoto, 2006). Also, regarding (13e) subject side parameter, more than 80% of the languages prefer placing subjects at the beginning of the sentence while a small number of others put subjects at the end of the clause. In short, as Cinque (1999) indicates, the Principles and Parameters Theory fails to offer a theoretical explanation for how one setting is unmarked (preferred) and the other one is marked (dispreferred).

B. Functional Filter after Theoretical Derivation

For the typological findings, there are two lines of explanation (Holmberg, 2016; Horie & Pardeshi, 2009): One is the Chomskyan formalist approach, and the other is the functionalist approach. Whaley (1997) maintains a need of functionalist explanation.

This type of 'why' question...often forces us to go beyond grammar itself for an answer... A reliance on an extragrammatical explanation closely aligns typology with functional approaches to languages (Whaley, 1997, p. 15)

Dryer (1992) suggests that consistent direction of branching may increase the efficiency of processing sentences, in accordance with his BDT (mentioned in section 3.3). Hawkins (1994; 2004; 2014) also argues that words and constituents are ordered in a way that they can be recognized as efficiently as possible. He maintains that efficient/functional structures are preferred over the other ones and that language use/performance based on functionality have shaped patterns of language variations and grammars.

Actually, Chomsky (1965) himself also has stated the influence of functionality to rule out some grammatical sentences.

...the unacceptable grammatical sentences often cannot be used, for reasons having to do, not with grammar, but rather with memory limitations, intonational and stylistic factors, 'iconic' elements of discourse, and so on (Chomsky, 1965, p. 11).

In recent years, Chomskyan formalists have become more open to functional explanations (Holmberg, 2016). Newmeyer (1998; 2004; 2005) maintains that language structures are formed reflecting their preferences for functional settings. According to Newmeyer, Chomskyan deductive theories generate possible languages and functional factors select probable languages. Kirby (1999) also states that functional settings are selected within the framework of generative theories.

An example of functional explanations for preferences of parameter settings is related to the subject side parameter. The reason why the majority of the languages put subjects at the beginning of sentences is that subjects are the topic/theme of the sentence in most cases (Comrie, 1989), and it is more functional to present a topic of the sentence at the beginning of a statement (Li & Thompson, 1976). Note that the preference for sentence-initial placement of a topic is not always true depending on surrounding contexts (Matsumoto, 2006). When the topic is accessible from the surrounding contexts, a topic can be right-dislocated (Givón, 1983), i.e., comment-topic order, which Mathesius called "pathetic" order (Mathesius, 1981, pp. 96).

This issue of the topic/subject-placement and functionality can be extended to the null subject parameter. It is even more functional to drop the subject/topic when both the speaker and hearer know what the topic/subject is. This may be why null-subject languages are more dominant than non-null-subject languages, i.e., majority of languages choose to allow null subjects because it is functional to drop redundant information.

Newmeyer (2001) suggests the following three candidates for functional influences on grammatical structure:

- (12)
- a. Parsing: There is pressure to shape grammar so the hearer can determine the structure of the sentence as rapidly as possible.
 - b. (Structure-Concept) Iconicity: There is pressure to keep form and meaning as close to each other as possible.
 - c. Information flow discourse: There is pressure for the syntactic structure of a sentence to mirror the flow of information in discourse.

According to Newmeyer, those functional pressures “tug on grammars from different directions and with unequal strength” (Newmeyer, 1999, p. 482). Based on this functional approach, it seems that the actual languages are derived from both theoretical and functional selections, but theories determine the possible languages, and the languages structures that are not functional are filtered out.

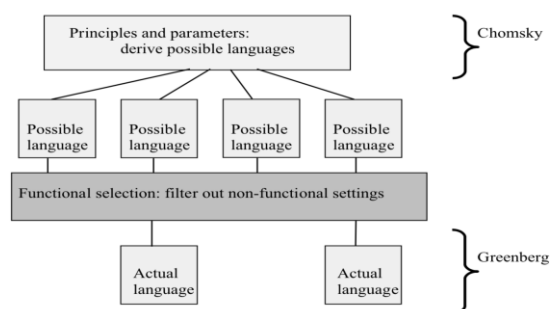


Fig 8: Language distribution through functional filter

As shown in the figure below, actual languages are derived from the principles and parameters, which Chomsky suggested, and then filtered through functional selection. As a result, actual languages appear as they are in the world, which Greenberg observed. Therefore, a direction of future study could be investigating the universal hierarchy of functionality (Cinque, 1999), i.e., what kinds of functions have priority over other ones in shaping the languages that actually exist in the world.

VII. CONCLUSIONS

This paper has reviewed different approaches to classifying languages. Linguists started with historical and geographical classifications. After that, Joseph Greenberg introduced methods for statistic typological classification and related typology in order to identify/investigate universal properties of languages. Greenberg’s study on word order enabled many typologists to identify universal syntactic and morphological rules, making Greenberg’s analysis even more complete. On the other hand, Noam Chomsky offered a deductive explanation for the language universals and differences found by inductive typologists. Chomsky’s Principles and Parameters Theory has been widely accepted and has become the mainstream in linguistic studies. Furthermore, functional approaches fill the gap in the Principles and Parameters Theory and typological observations. Based on the fact that parameters are set unevenly in languages and that significantly more languages prefer one setting over another, functionalists have argued that the different levels of functionality select the settings of a parameter.

Including the typological, theoretical and functional factors, however, many other factors could also influence the derivation of languages. For

example, studies by Dunn, Greenhill, Levinson and Gray (2011a; 2011b) suggest that the common and different linguistic properties among languages are the results of diachronic transmission processes and cultural evolution within language families. They conclude that “language universals” are lineage-specific to individual families, and the lineage-specificity gives stronger predictions of the common properties between languages, beyond Greenberg’s universals and Chomsky’s Principles and Parameters Theory. Their argument concerning the diachronic effect has led to a debate about whether dominant language forms are the result of diachronic changes or locally motivated changes (Bickel, 2007).

Also, since the publication of the World Atlas of Linguistic Structures (WALS), numerous amounts of data, including approximately 144 grammatical features, are now accessible for language studies. One of the striking findings of WALS is the evidence of geographical effects among languages that do not share phylogenetic lines. For example, as Holsberg (2016) points out, several studies of the maps in WALS indicate that many grammatical properties, including tone, numeral classifiers and comparative constructions, exhibit strong areal correlations (Maddieson, 2011; Gil, 2011; Stassen, 2011). On the other hand, Dryer (2011a; 2011b) found many grammatical features that show no clear geographical effect.

The variety of above recent studies suggest a need to discuss historical classification, geographical classification, typological classification and formal accounts collectively. Whaley (1997) states:

...in all likelihood, the unity of language, and consequent language universals, arises from a slate of interacting factors, some innate, others functional, and still others cognitive, experimental, social, or historical. (Whaley, 1997, p. 6)

After all, it seems that existent languages that are spoken by human beings may be explained by the studies in all linguistic fields, including syntax, morphology, semantics, phonology, phonetics, sociolinguistics, historical linguistics, pragmatics, discourse analysis, psycholinguistics and so forth. With the combined effort of all of these fields, we may be able to explain why languages are shaped by different parameters and the universals that form those parameters

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