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What the Tree Model Represents : Language Change, Time Depth, and Visual Representation

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9. What the Tree Model Represents: Language Change, Time Depth, and Visual Representation

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Abstract

In this chapter, I will argue that a tree diagram provides a visual representation of the long-term, linear relationship among languages, which can be referred to as the result of “macro-comparison.” A contrasting idea is “micro-comparison,” where language data from geographically close areas are compared and reconstructed. In a micro-comparison, a significant part of the data is expected to consist of local innovations and features acquired through contact, which are known to not be well-represented in a tree diagram. Several points will be made. First, whether it is appropriate to use a tree diagram or not depends on the researcher’s viewpoint rather than the actual nature of the development of the language. This will be demonstrated by taking Hawaiian and sign languages as examples. Then, the relationship between the linear developmental paths of languages and other aspects are examined. It is claimed that it is a change of methodology in comparing and reconstructing languages and a change in the linguistic data that is being compared that has resulted in linguists conducting micro-comparison. As a result, linguists have become more aware that what can be expressed with a tree diagram is limited. Finally, it is suggested that, even when the focus of the research is micro-comparison, a tree diagram may still be useful, to show the general context of the development of relevant languages as a visual representation.

9.1. Introduction

Minaka (2013) shows, using Fürbringer’s (1888) drawings of the phylogeny and classification of bird species, how the diachronic development of the component items relates to an observation that focuses on short-term horizontal relationships among them (Figure 9-1). The former is represented by a tree model, while the latter by a diagram that is like the so-called “wave model.”

It is shown that a taxonomic classification is just like slicing out a short time span from the phylogenetic tree to view it from a different angle, to see what the synchronic relationships among the components are like. Minaka (2013) also notes that a similar observation is found in Rodriguez 1950 (Figure 9-2). Rodriguez analyzed Bessey’s diagrams that were used to describe the taxonomy and the phylogeny of Angiosperms

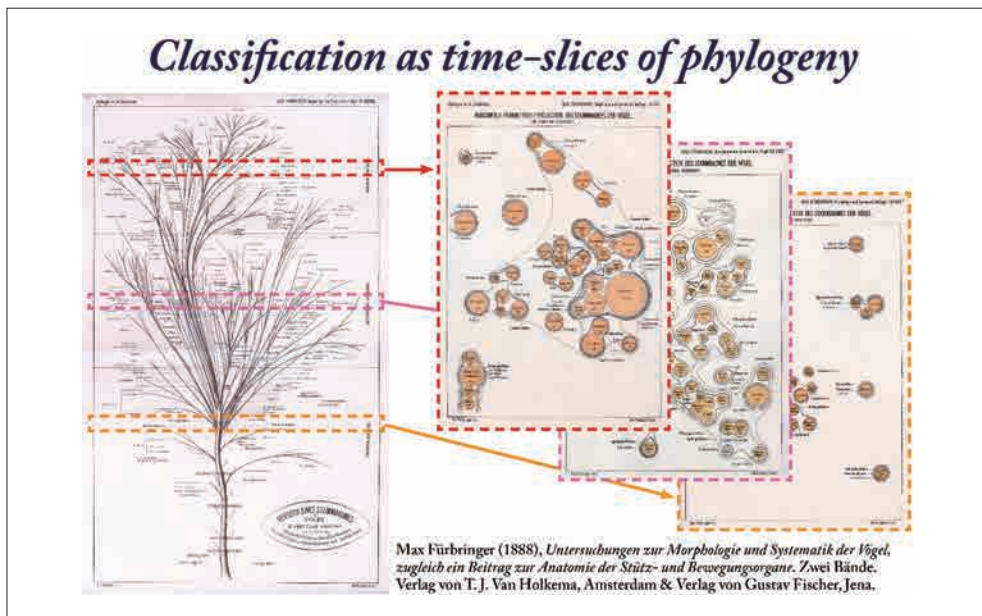


Figure 9-1 Fürbringer's drawing showing a tree and its cross sections shown as "Classification as time-slices of phylogeny" by Minaka (Fürbringer 1888, cited from Minaka 2013)

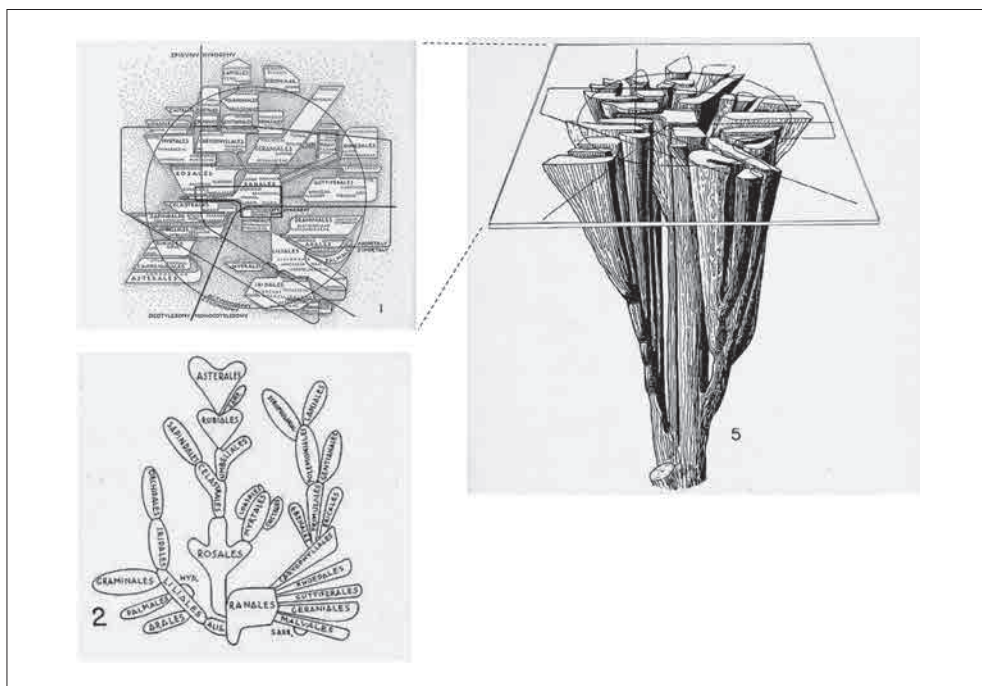


Figure 9-2 Bessey's diagrams showing the relationship of *Angiosperms* (left) and their interpretation by Rodriguez expressed in the form of a tree (right) (Rodriguez 1950: 216–217)

(Figure 9-2), and concluded that a three-dimensional tree-like model would best capture the nature of the relationship of the species.

The diagrams that appear in the articles mentioned above are reminiscent of two models frequently used in linguistics. One is the tree diagram that is used to represent genetic (vertical) relationships of languages and the other is the wave model that is used to show horizontal relationships among languages. What I would like to point out is that first, the nature of the relationship between a tree diagram and a wave model in linguistics is like those observed with phylogenetic trees of creatures. That is, a tree diagram represents the general diachronic development of languages, while a wave model slices out a certain period of the tree to show the synchronic relationship among languages. According to List *et al.* (2014), the family tree model has been used in the field of historical linguistics to represent the genetic relationship among languages since 1853, when Schleicher (1853) published two articles showing the relationship of languages (Figure 9-3). Schrader (1907) subsequently pointed out that horizontal relationships are not expressed in the tree model, and he proposed the wave model (Figure 9-4). With Schrader's observation and others, linguists have always been aware that there are aspects of the development of languages that are not or cannot be adequately expressed in the tree diagram. However, what exactly is expressed of the history of languages using the tree model has not been clearly captured either.

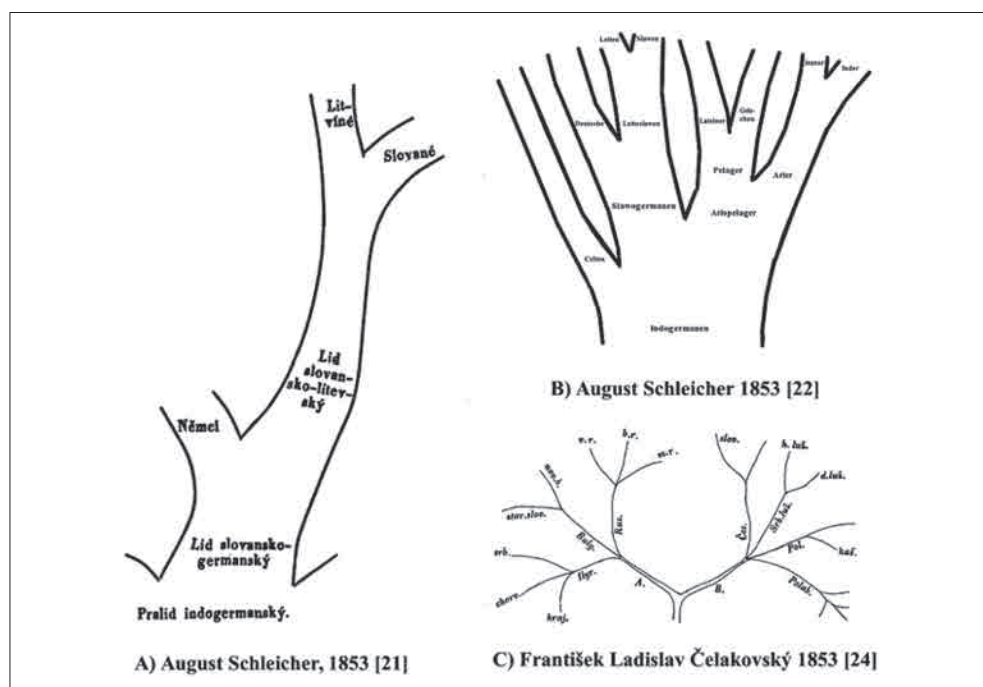


Figure 9-3 Early family trees of languages by Schleicher (1853) and Čelakovský (1853) (cited from List *et al.* 2014)

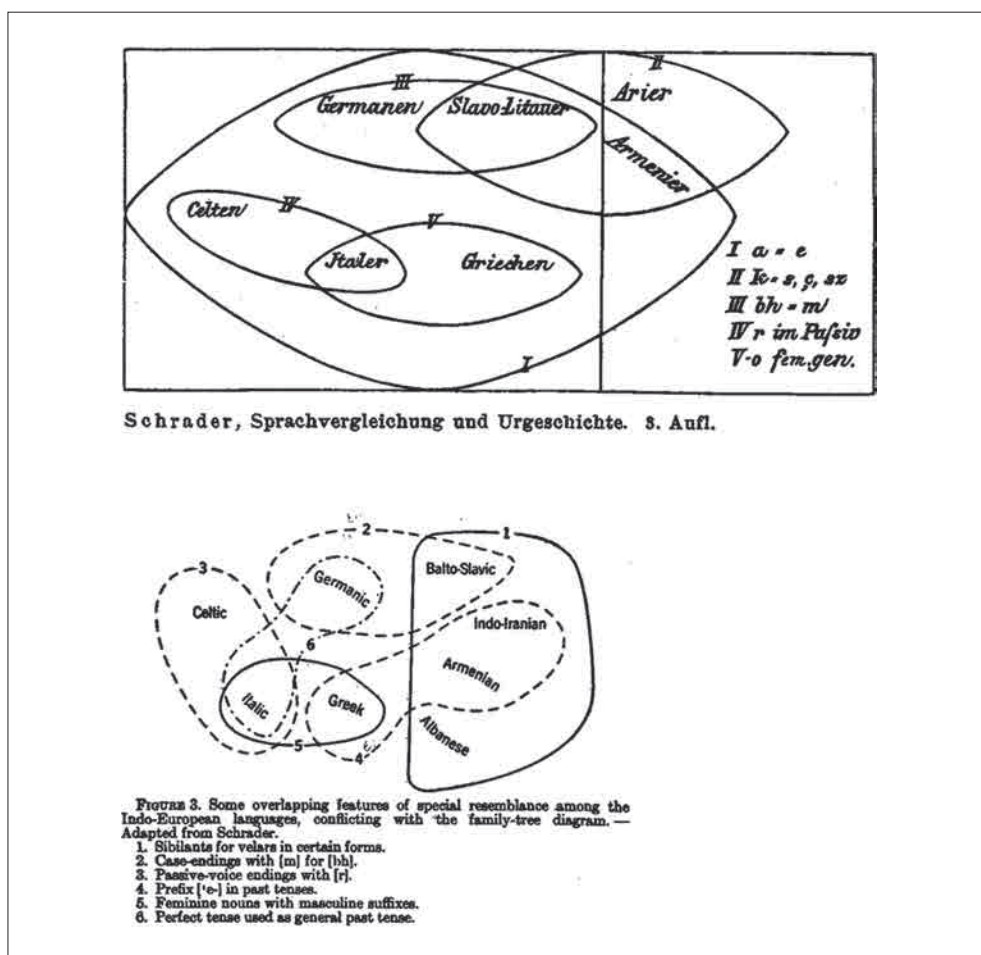


Figure 9-4 Wave models cited from Schrader (1907, top) and Bloomfield (1933, bottom)

In this chapter, I will argue that the tree diagram is good for showing the long-term linear development of languages. When development within a short period is examined, such aspects as lateral influence and non-linear developments come more into focus, and the tree diagram becomes unsuitable. However, the tree model may still be useful in such a context for showing the general development of languages, to place the change under discussion in a broader context. This claim is in line with those proposed by Fürbringer and Rodriguez and may sound classic, but to my knowledge it has not been related to the methodology and processing of linguistic data.

Specific cases from the Austronesian language family and sign languages will be discussed to illustrate this point. These two groups of languages share the characteristic that they had no writing system until recently, and in some cases, even now. The two differ, however, in that the former is one of the most successful cases of the application

of the Comparative Method and family tree models (Ross 1996a: 184). The latter, however, to the author's knowledge, has never been expressed by a tree diagram in describing their histories. By comparing these two contrasting cases, I hope to be able to capture the nature of the tree diagram better in a linguistic context.

The rest of this chapter is presented as follows.

In Section 9.2 is a brief introduction to the two groups of languages in the context of historical studies and in relation to the family tree model.

In Section 9.3, two parallel cases of a disjunction in language transmission will be described and how they relate to tree diagram representation. One case is of Hawaiian, an Austronesian language spoken in Hawai'i, and the other is the case of sign languages. It will be argued that with the case of Hawaiian, the disjunction can be viewed both from a short-term "zooming-in" manner as well as from a long-term "zooming-out" manner. The latter is to capture the phenomenon as a part of the over-all changes in languages in the family. On the other hand, there is limited documentation of the historical facts about sign languages, and methodology for the comparison and reconstruction of signed expressions is not established. Therefore, only a short-term perspective exists with the historical development of sign languages. I claim that this is part of the reason why a tree diagram, which reflects long-term relationships, has never been used with sign languages.

A tree diagram represents long-term language dispersals, covering a wide geographical area. This view is the reason why linguists have begun to recognize again that there are various aspects of a linguistic relationship that cannot be expressed, or may even make a conflict with what is expressed and implied in such a model. In Section 9.4, I will argue that at least part of the problem is the result of recent changes in methods and available data in the field of historical linguistics. Specific examples will be presented from the Austronesian language family to illustrate that these points have resulted in a shift from the classic macro-comparison of languages to a modern micro-comparison, requiring different types of visual representation from a tree model.

Section 9.5 presents concluding remarks.

9.2. Background of the Languages Referred to in This Chapter

In this section, two groups of languages of different modalities, namely, the Austronesian languages and sign languages will be briefly introduced. The historical study of the two groups contrast with each other in terms of time depth and method of study.

9.2.1 Austronesian Languages

The tree diagram has been closely tied to the Comparative Method (see Introduction in this volume), which developed based on studies of the Indo-European languages. The method was ultimately applied to languages in the Pacific and the Pacific Rim, which were shown to form a single language family, namely, the Austronesian language family.¹⁾ The family tree model has been used to represent various sections of the language family, although it is not clear when the first Austronesian family tree was drawn. A family tree

reflecting some current subgrouping hypotheses is presented in Figure 9-5. The member languages in this family are geographically spread across 10,000 kilometers of coast line and sea (Bellwood 1991). Proto-Austronesian, their common ancestral language, is considered to have been spoken around 5000 BP based on archaeological data (cf. Tsang and Li 2015, Chapter 6 in this volume). The figure thus reflects the diversification of languages in the past 5,000 years, which took place in a vast geographical area.

9.2.2 Sign Languages

Sign languages are languages that utilize the gestural/visual channel instead of the vocal/auditory one.²⁾ It should be noted that sign languages are not the signed-versions of spoken languages, and their development and transmission are independent from the spoken languages used in the same area.³⁾ For example, American Sign Language used in the U.S. is related to French Sign Language (*Langue des Signes Française*, LSF) and not British Sign Language, although English is spoken in the U.S. and U.K. Likewise, Japanese Sign Language and Taiwan Sign Language are considered to be related while spoken Japanese and Taiwanese (and Austronesian aboriginal languages in Taiwan) are not. A summary of historical sign language linguistics appears in Fischer (2015). About 300 to 400 sign languages are considered to exist in the world, and 149 are listed in *Ethnologue* (Simons and Fennig 2017). Unlike a spoken language, which does not appear *ex nihilo* (François 2015: 161), a sign language may spontaneously emerge and be used in a community when they have deaf members. There are other aspects in the development of sign languages that are different from spoken languages as we will see later.

Sign languages do not have a writing system, and the historical study of these languages relies on historical facts and very limited old notes where signs are described by words and/or some pictures, as well as video footage when available. Specific changes equivalent to “sound change,” such as loss, addition, metathesis, as well as visually specific changes such as centralization and fluidity have been reported for these languages, based on a comparison between American Sign Language and French Sign Language (Frishberg 1979; Woodward and De Santis 1977, etc.), and for Japanese Sign Language (Isobe et al. 2012). The comparative method used for spoken languages is not directly applicable, for there is no consistent way of transcribing signs and in addition, sign languages use multiple articulatory signals that are simultaneously produced. Thus, the method developed for the comparison and reconstruction of single linear languages needs modification, although the principles should still be valid when focused on a part of the system (Kikusawa and Sagara 2015).

9.3. Zooming In and Out of A Tree Model

In this section, I will present the idea of “zooming in and out” of the tree model. When zoomed in, linguistic developments within a short time span are focused, just like having a look at a cross-section of a tree. When zoomed out, longer-term developmental paths are in focus. Specific cases that are looked in this chapter are the transmission of

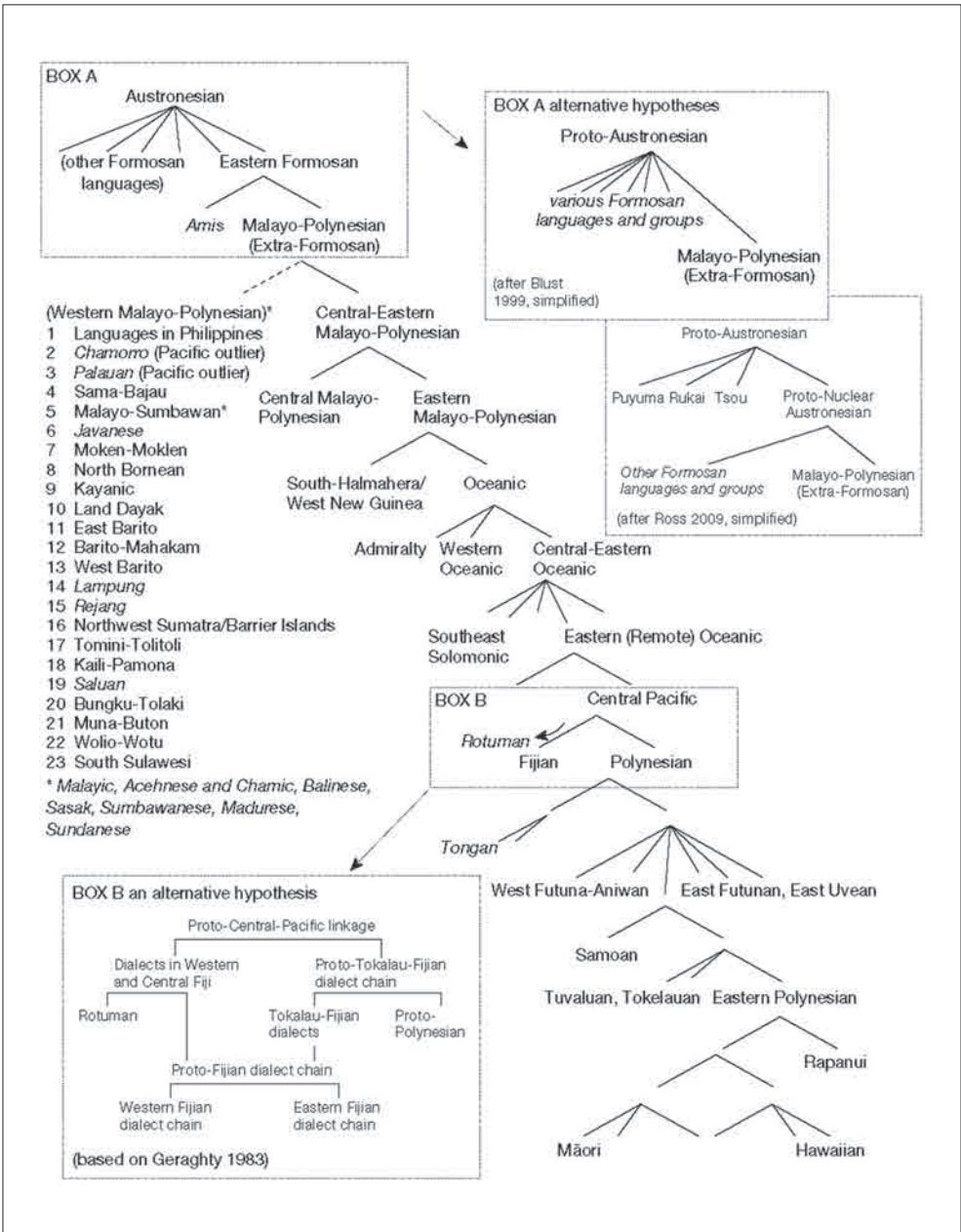


Figure 9-5 An Austronesian family tree (Kikusawa 2015: 659)

Hawaiian and sign languages. Hawaiian has undergone a process which could be interpreted as horizontal transmission through language revitalization. As for sign languages, the default transmission is horizontal. By examining how these aspects may or may not be expressed in a tree model, I will show how long-term development is well represented in a family tree while a short-term one is not, and point out that the what a tree diagram represents changes depending on the view-point of the researcher.

A general assumption of language transmission typically involves a seamless, vertical transmission from parents to children. However, there are cases where this does not hold. Such a case may be useful to examine in order to understand how language diversification is reflected or not in a tree diagram.

Hawaiian, a Polynesian language spoken in Hawai'i was once nearly extinct. The number of the speakers of Hawaiian at the end of the 19th century is estimated to have been about 300,000. However, by 1980 it was down to 2,000, among which the population younger than 18 was about 20. Revitalization took place through monolingual schools, starting with the founding of a kindergarten, followed by an elementary school, high schools, then by college education. As a result, the speakers of Hawaiian now exceeds 24,000, of which 2,000 are native speakers (Warschauer and Donaghy 1997).

The revived Hawaiian language is sometimes referred to as the "UH dialect", with "UH" standing for the University of Hawai'i. This is because the variety taught at schools was based on descriptions and documented materials of Hawaiian compiled by linguists at the University of Hawai'i. When school teachers came across terms which they did not know, dictionaries and grammar books were referred to. Also, some words were inferred based on sound correspondences with other Polynesian languages. Thus, Hawaiian at one stage was not transmitted from parents to children, but children acquired the language at school, through their teachers and peers.

This fact is commonly known among linguists specializing in Austronesian languages, however, it never seems to appear on the Austronesian family tree. Figure 9-6 shows two tree models (top and middle) showing the relationship among Eastern Polynesian languages, where Hawaiian appears as one of the languages that directly developed from Proto-Marquesic, or from Proto-Central-Eastern.

This reflects that fact that the focus of a tree diagram is not on the detailed processes of the development of each language, but it is i) the continuity from the proto-language to the languages spoken today and ii) how innovations are shared (Introduction in this volume). From this view point, it is correct that Modern Hawaiian appears as one of the daughter languages of Proto-Marquesic, or Proto-Central-Eastern. The Figure at the bottom of Figure 9-6 is an attempt to show the disjunction in the transmission of Hawaiian. If zoomed into the time range where Hawaiian underwent revitalization (for about 20 years), probably this is how the developmental path would look. Note, however, that the tree diagram of Eastern-Polynesian languages indicates a time depth of at least 1,000 years, from the time Proto-Eastern-Polynesian was spoken till the present. Considering this, it is not surprising that the "small" disjunction is not reflected in the diagram.

From the view point of language transmission, that of sign languages can be said to

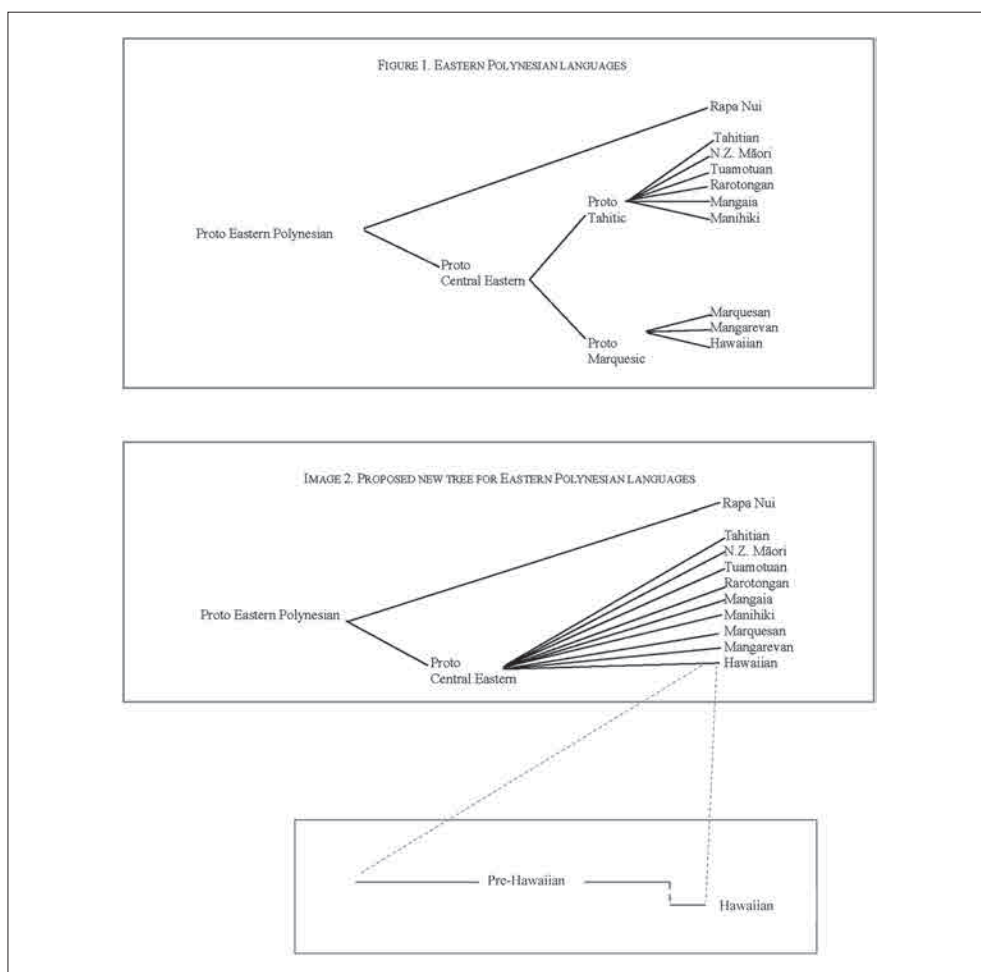


Figure 9-6 Tree diagram showing the relationship among Polynesian (compiled by Marck 2000, cited from Walworth 2014: 257, top), Walworth (2014: 268, middle), and the “disjunction” in the development of Hawaiian (added by the author, bottom)

parallel the one described above for Hawaiian. Here, vertical transmission is not the common presupposition. When a deaf child is born to Deaf parents, his/her first language is naturally the sign language the parents use, and thus the language is transmitted in the same way as spoken languages.⁴⁾ This is often the same for hearing children born to Deaf adults (CODAs), who learn the parents’ sign language as their first language. However, the transmission of sign languages differs from that of spoken languages in that most signers acquire their sign language through horizontal transmission rather than vertical. According to Mitchell and Karchmer (2004, cited from Smith 2013), only 4% of deaf children are born to Deaf parents, and 8% have one Deaf parent. This means that 92% of deaf children are born to hearing parents. Such children acquire their sign language(s)

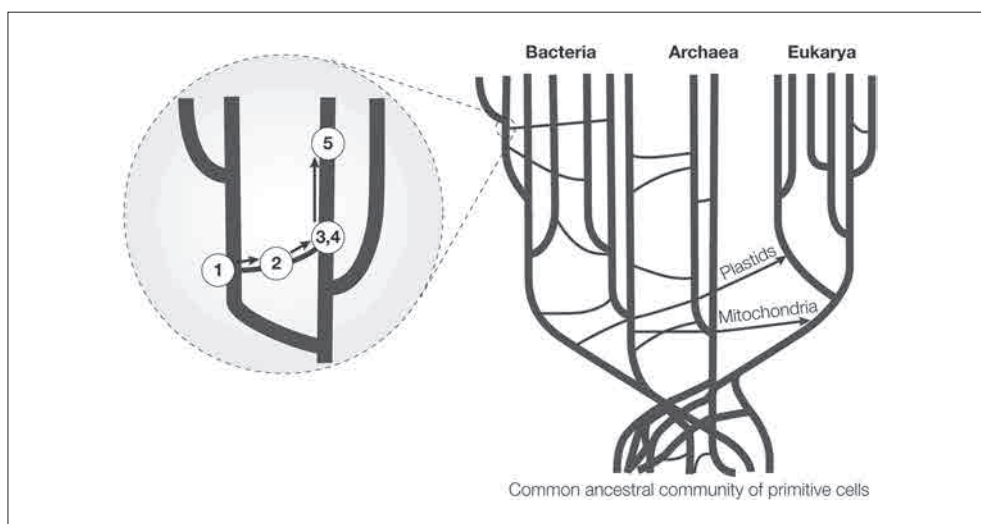


Figure 9-7 Tree of life showing vertical and horizontal gene transfer. Local changes are specified as forming a part of the tree diagram which shows the general development of the relevant creatures (Smets and Barkay 2005: 676).

outside their home, mostly at schools where there is a community of deaf/Deaf children. This is part of the reason why dialects of sign language are related to deaf schools while those of spoken language are commonly related to area (Fenlon and Wilkinson 2015: 16–17). Horizontal transmission implies that there are some disjunctions in the development of language. This is one of the factors why it is not suitable for sign languages to appear on a tree model. However, another aspect of the historical study of sign languages is that the paths of their long-term development (beyond historical documentation) is not known. This requires analysts to focus on short-term developments of the languages. Thus, the reason why the tree diagram is not used for sign languages is probably not as much as the fact that their transmission is horizontal, but the fact that such information which would be best represented by the tree diagram is missing.

With this in our mind, a tree diagram would be more effectively used, if it represented the background context of a short-term and/or one-off development, as in Figure 9-6. It is commonly known that contact relationships and lateral influence are not included in a tree diagram, however, by combining the tree model with a zoomed-in section, such localized change can be effectively presented, and this is in fact the case in the field of biology.

Figure 9-7 shows the horizontal/lateral gene transfer in creatures. Figure 9-8 shows a case of the replacement of a lexical item indicated on a family tree. In both cases, a local change is presented in the context of the over-all development of the object, by placing the change on a family tree. Figure 9-9 is a diagram where lateral transfer of lexical items in Indo-European languages is presented.

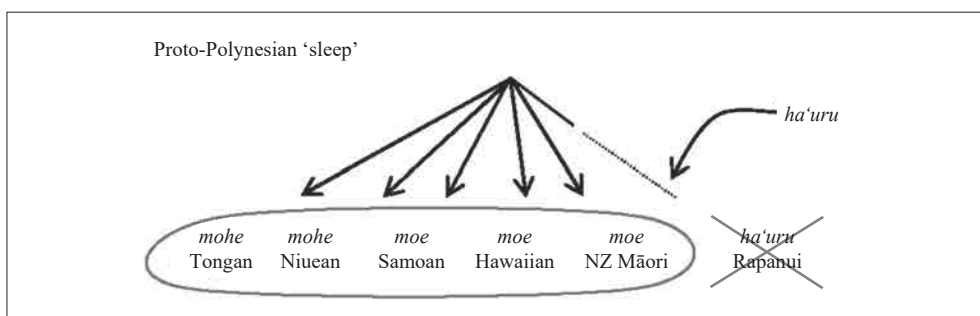


Figure 9-8 Replacement of lexical item in a Polynesian language indicated on a tree model (Kikusawa 2017)

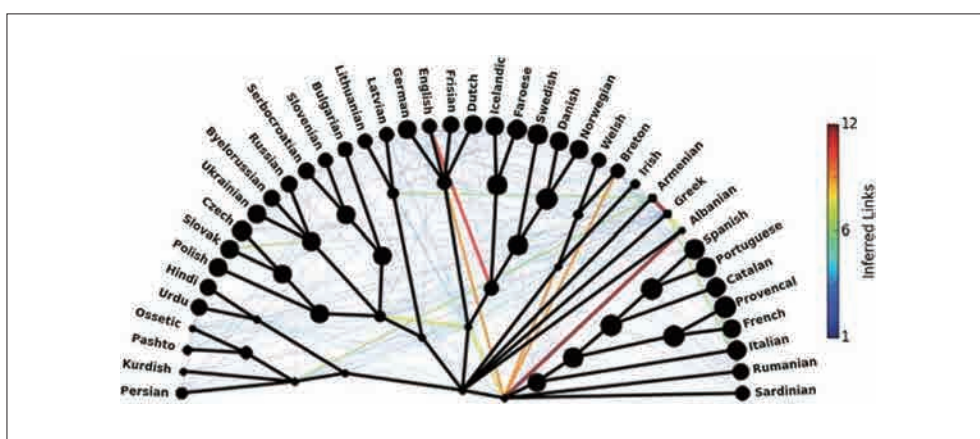


Figure 9-9 Lateral transfer of lexical items indicated in a diagram (cited from List et al. 2014)

9.4. Changes in the Application of the Comparative Method and the Tree Model

The tree diagram assumes a single source and linear relationship, and is good for capturing and expressing the long-term, general development of languages. This helps us understand why various aspects of linguistic relationships that cannot be expressed using a tree diagram have been pointed out. I will argue that this is the result of i) a change in methodology, ii) the introduction of new ideas, and iii) the increase of available data in the field of historical linguistics. All these can be generalized as a shift from macro- to micro-comparison and reconstruction. Specific examples will be presented from the Austronesian language family.

9.4.1 Changes in Methodology

As the Comparative Method has been applied to various languages, the methodology has developed. For example, it has been shown (Biggs 1965) that by identifying layers of sound correspondences, contact relationships as well as borrowed lexical items from related languages (indirect inheritance) can be identified. This method is now applied in

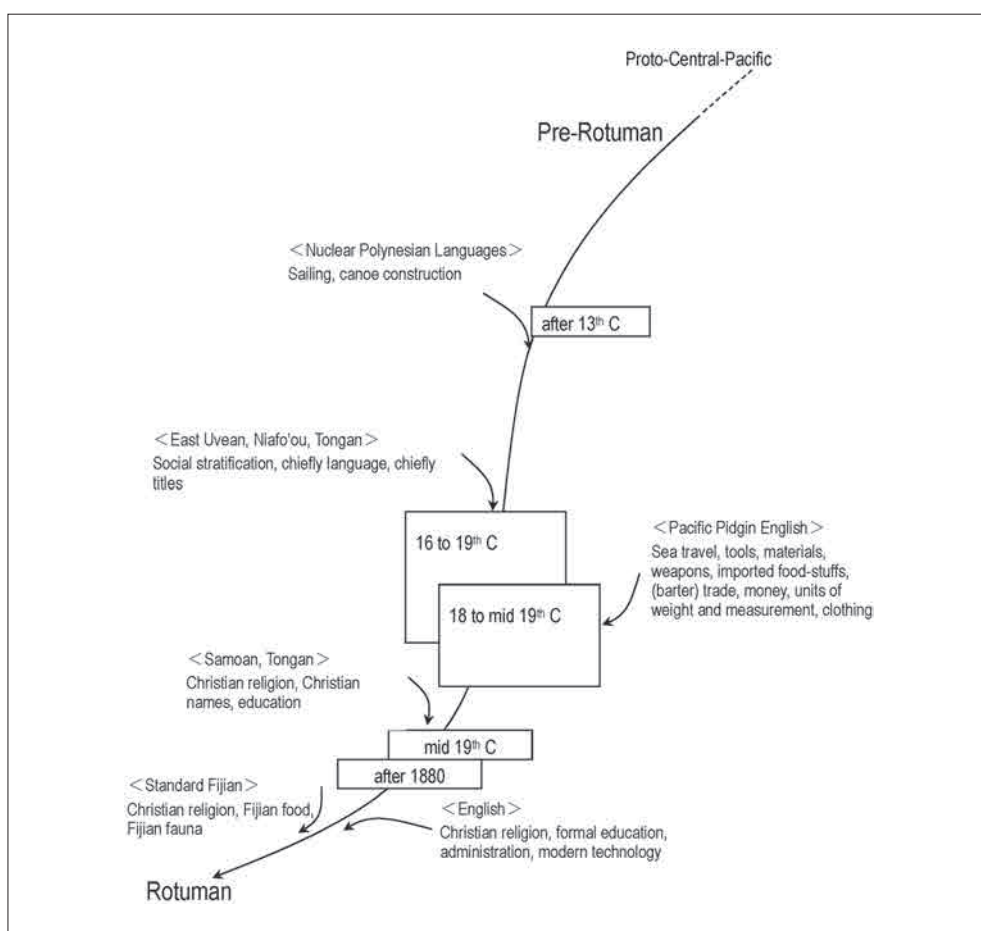


Figure 9-10 Borrowed items in Rotuman and their sources (based on Schmidt 2003: 235, cited from Kikusawa 2015: 667)

various languages (Blust 1992; Ross 1996b). Schmidt (2003), by applying such a method, shows that five different sources of lexical items in Rotuman can be identified. Figure 9-10 is an attempt to visually represent Schmidt's hypothesis. It can be seen that the details of the development of a single language within a relatively shallow time depth are presented. This is the kind of information that cannot be incorporated into a tree diagram where all the Central-Pacific languages are listed.

9.4.2 Introduction of New Ideas

In modern historical linguistics, when reconstructing a proto-language, which while clearly hypothetical, needs to conform to the various constraints that are applied to a real language. This leads also to the recognition that a proto-language also had dialects both social and areal, as all current languages have, and could have been part of a dialect

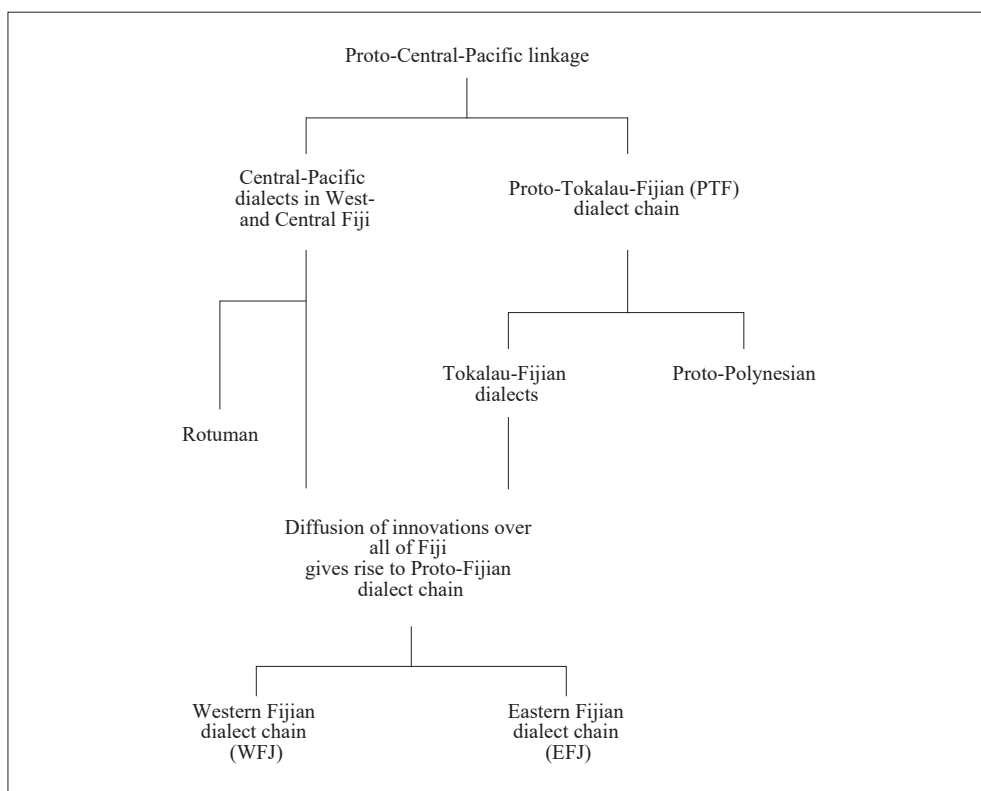


Figure 9-11 Reconstructed dialect linkages incorporated into a family tree (Schmidt 1999, cited from Schmidt's website)

linkage. Such a situation is implied in and confirmed by data resulting from micro-comparison, or a comparison and reconstruction of both geographically and genetically close languages.

Geraghty (1983) and Ross (1988) propose the notion “dialect chain/linkage,” consisting of a sequence of dialects spreading like chains where adjacent dialects are mutually intelligible, but remote dialects in the same chain are different from each other to the extent that they cannot communicate with each other. Geraghty (1983) and Ross claim that this situation could not be expressed by a tree model and introduce double, horizontal lines to show a dialect chain or linkage. Figure 9-11 shows Geraghty’s (1983) subgrouping hypotheses of Proto-Central Pacific compiled by Schmidt (1999), and Figure 9-12 shows Ross’s subgrouping hypothesis of Eastern Admiralty languages, which also includes dialect linkages at different reconstructed stages.

9.4.3 Change in the availability of data

There has been a big change in the type of data used for historical comparison and reconstruction. In the past, there was much less language data available, and what there

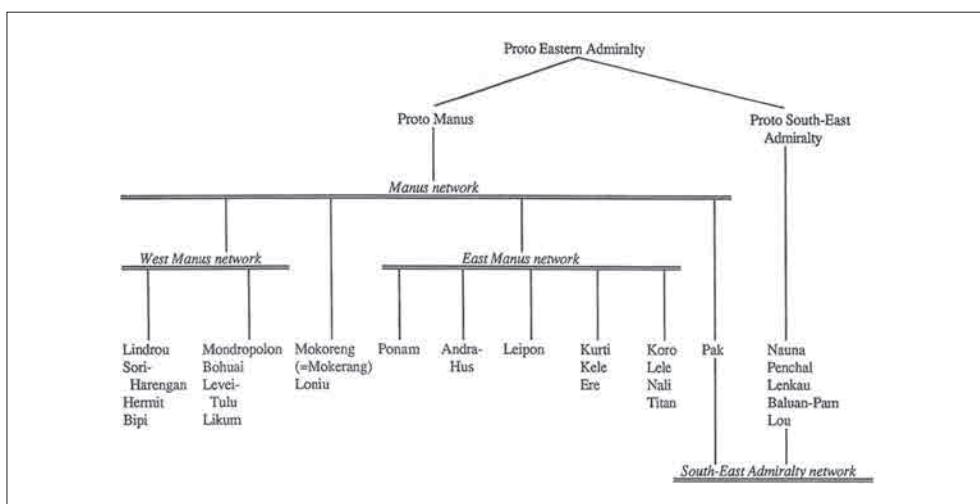


Figure 9-12 Reconstructed dialect linkages incorporated in a family tree (Ross 1988)

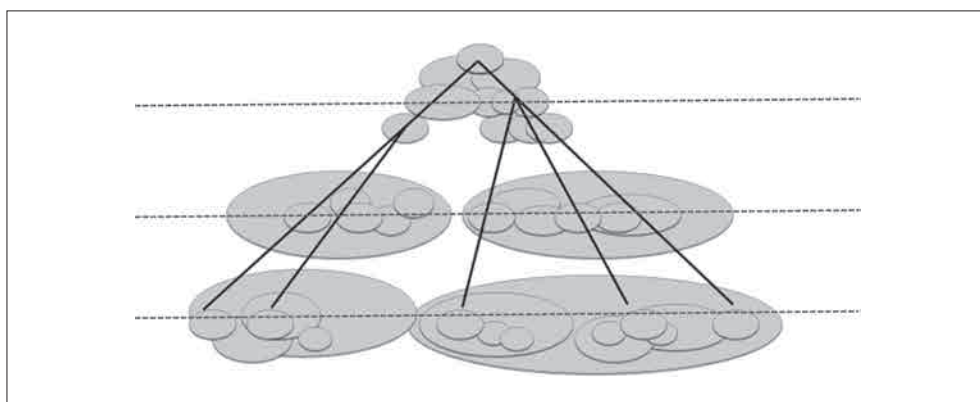


Figure 9-13 Comparing two dimensions of language development (compiled by the author)

was came from geographically scattered languages with a limited number of lexical items. However, much more data are currently available from areas geographically in proximity and genetically closely related. This means that what is being analyzed is closer to the cross-sections that were shown in Figure 9-1 and Figure 9-2, shown earlier in this chapter. In fact, Geraghty and Ross, whose works were referred to in the previous subsection both conducted intensive fieldwork in the areas where the languages are spoken, and used first-hand data for comparison and reconstruction. This is also true with François, whose data Kalyan and François use to propose a glottometric diagram (Chapter 5, also François 2015: 183), which is their solution for not being able to “fit” their data into the form of a tree diagram.

Figure 9-13 shows a comparison of two dimensions of language development. Solid lines, in the shape of a tree, indicate the lineal, continuous characteristics shared by modern day languages. Circles, which are meant to be two dimensional with the depth, crossing the solid lines, indicate the synchronic distribution and relationship of languages at each time cut by the dotted line, reflecting local innovations and linguistic features spread through contact.

9.5. CONCLUSION

The tree diagram is a visual representation of the general relationship among languages. In the field of Historical Linguistics, the diagram has been closely tied to the Comparative Method, which is the major method traditionally applied for identifying genetic relationships among languages. Until now, for this reason, the diagram has been often used without closely examining what it exactly represents. It is possible that linguists were sometimes bound by the diagram to even try to fit their data into it.

In this chapter, I have tried to show that a tree diagram shows the paths of the long-term development of languages. It is the continuation of shared innovations that define a linguistic family tree, and these are identified by macro-comparison. Contact relationships, horizontal transmission, short-term developments of each language, and areal features are all associated with micro-comparison and belong to a different dimension from those expressed by a tree diagram. The two dimensions can be related by considering the latter forming cross-sections of the former.

When the results of micro-comparison are in focus, one practical way of using the tree diagram is to use it for showing the general development of languages, which helps to clarify the background context. It should be also noted that the tree diagram is a visual representation, and the diagram is best used to supplement information visually. Figure 9-14 was compiled as an attempt to summarize the relationship among sign languages related to British Sign Language, American Sign Language and French Sign Language (based on Fischer 2015: 445–447 and Wittmann 1991). The diagram does not show all the aspects of the development of the languages, nor does it show the details of contact and local development, which are often the main topics in the discussion of the development of a sign language. It also lacks information about the emergence of sign languages. However, it helps to see which language relates to which at a glance and captures the overall development of the languages.

Again, a tree diagram is best used as a visual representation of long-term relationships among languages. Single sourced, linear developments are well-represented, while a component with multiple sources is typically not included. The key is to know what it represents, and which of the other models to combine it with, to display what one wants to present.

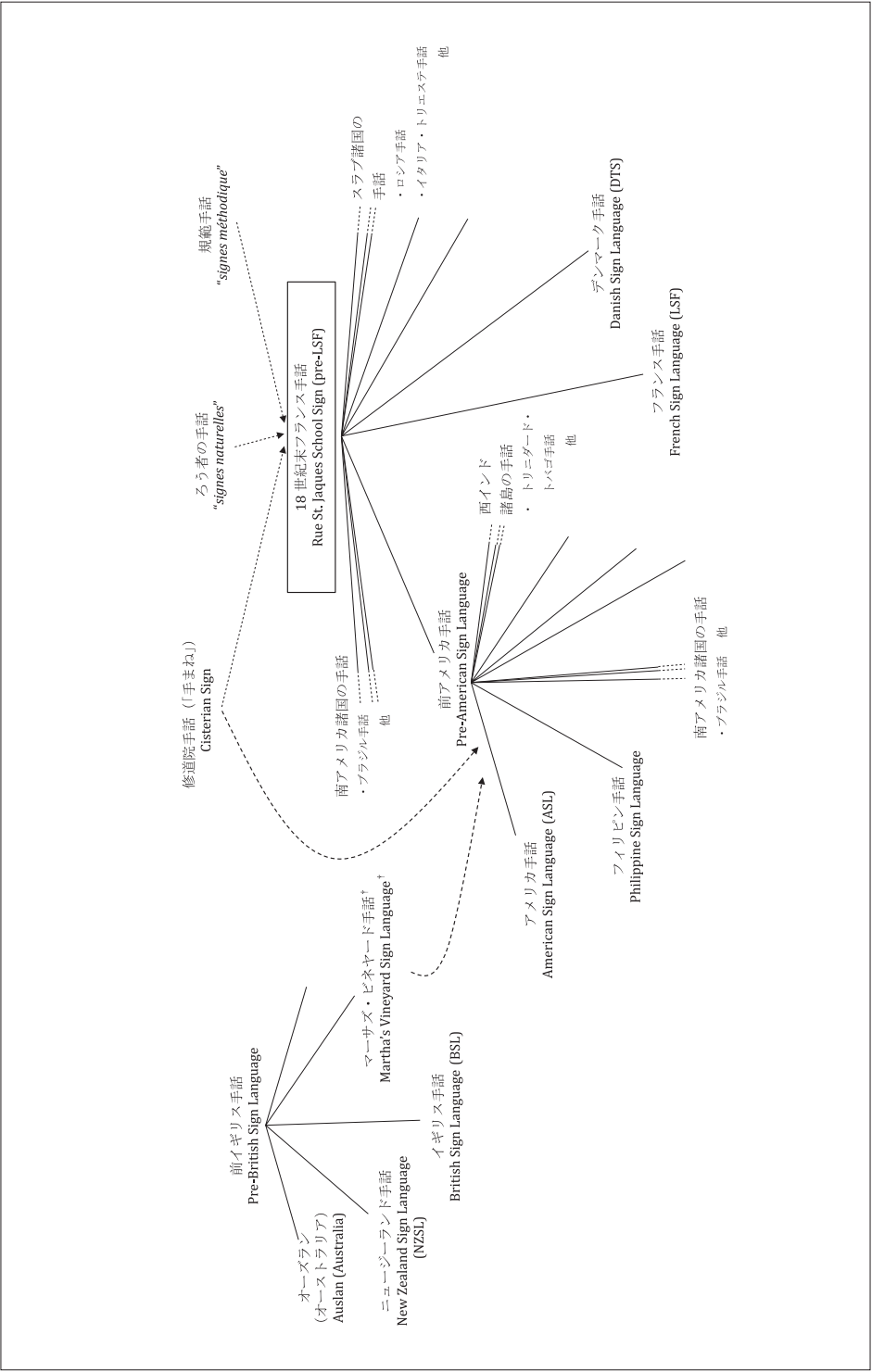


Figure 9-14 An attempt at drawing a family tree summarizing the development of languages related to French Sign Language (Kikusawa 2016: 7)

Notes

- 1) The existence of ‘similar’ languages covering a vast area reaching from the western edge of the Indian Ocean to the eastern Pacific was recognized by European travelers from the beginning of the seventeenth century. Eventually, the term Austronesian (‘southern islands’) was coined by Wilhelm Schmidt in 1906, which became the fixed term for this group of languages since then.
- 2) For an overview of sign languages and their historical development, see Fischer (2015). Wittmann (1991) lists and classifies 80 sign languages into three types according to whether each has identifiable related languages or not.
- 3) However, a sign language is usually in contact with a local spoken language(s) and is continuously influenced by the spoken language(s) in the area.
- 4) In this chapter, the term “Deaf” is used to refer to signers of a sign language, contrasting with “deaf,” which indicates medically deaf.

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