

Isolated Dialectal Forms and Language Substratum in Japan

Fumio Inoue

Interdisciplinary Perspectives
on the Origins of the Japanese
INTERNATIONAL SYMPOSIUM 1996

International Research Center for Japanese Studies

Isolated Dialectal Forms and Language Substratum in Japan

Fumio Inoue

Tokyo University of Foreign Studies

ABSTRACT

In this paper a hypothesis will be discussed concerning relationships between the geographical distribution of dialectal words and the prehistory of language. The so-called isolated form, that is a dialectal word which is found only in one locality in a linguistic geographical survey of all Japan, shows a certain geographical tendency. This tendency can be explained by some general geographical principles in historical linguistics.

(1) The longer the age of habitation, the greater the divergence of dialects. (2) The greater the barriers of communication, the greater the divergence of dialects. (3) Centralization of government, development of transportation and mass communication etc. encourage the integration of dialects.

In the case of the isolated forms found in the data from the "Linguistic Atlas of Japan", more isolated forms were found in southern Japan, especially in the Southwestern Islands (Ryukyu Islands). The overall tendency of geographical distribution was summarized by calculating the numbers of localities per prefecture where the isolated forms were reported.

There is another database compiled by Ms. Kasai which shows degrees of standardization for 82 selected words from the "Linguistic Atlas of Japan". Average degrees of standardization were calculated for each prefecture (Inoue & Kasai 1989).

According to the third principle of geographical historical linguistics, the degrees of standardization and diversification which can be represented by numbers of isolated forms, show an inverse correlation. When the two databases were compared, the difference between Eastern and Western Japan became conspicuous. Tohoku dialect of eastern Japan is not very standardized, but it does not report many isolated forms; the Kyushu dialect of western Japan shows similar degrees of standardization to the Tohoku dialect, but it shows many isolated forms.

The archaeological and historical data show that people of the Yayoi culture began to live in southern Japan in the 2nd or 3rd centuries BC, while they reached northern Japan many centuries later. The power of the Yamato Imperial

Court reached northern Japan in the 7th or 8th century AD. Archaeological artifacts of Jomon culture lingered for some time in northern Japan. Most physical anthropologists believe the Ainu people are descendants of Jomon people, sometimes referred to as proto-Mongoloid.

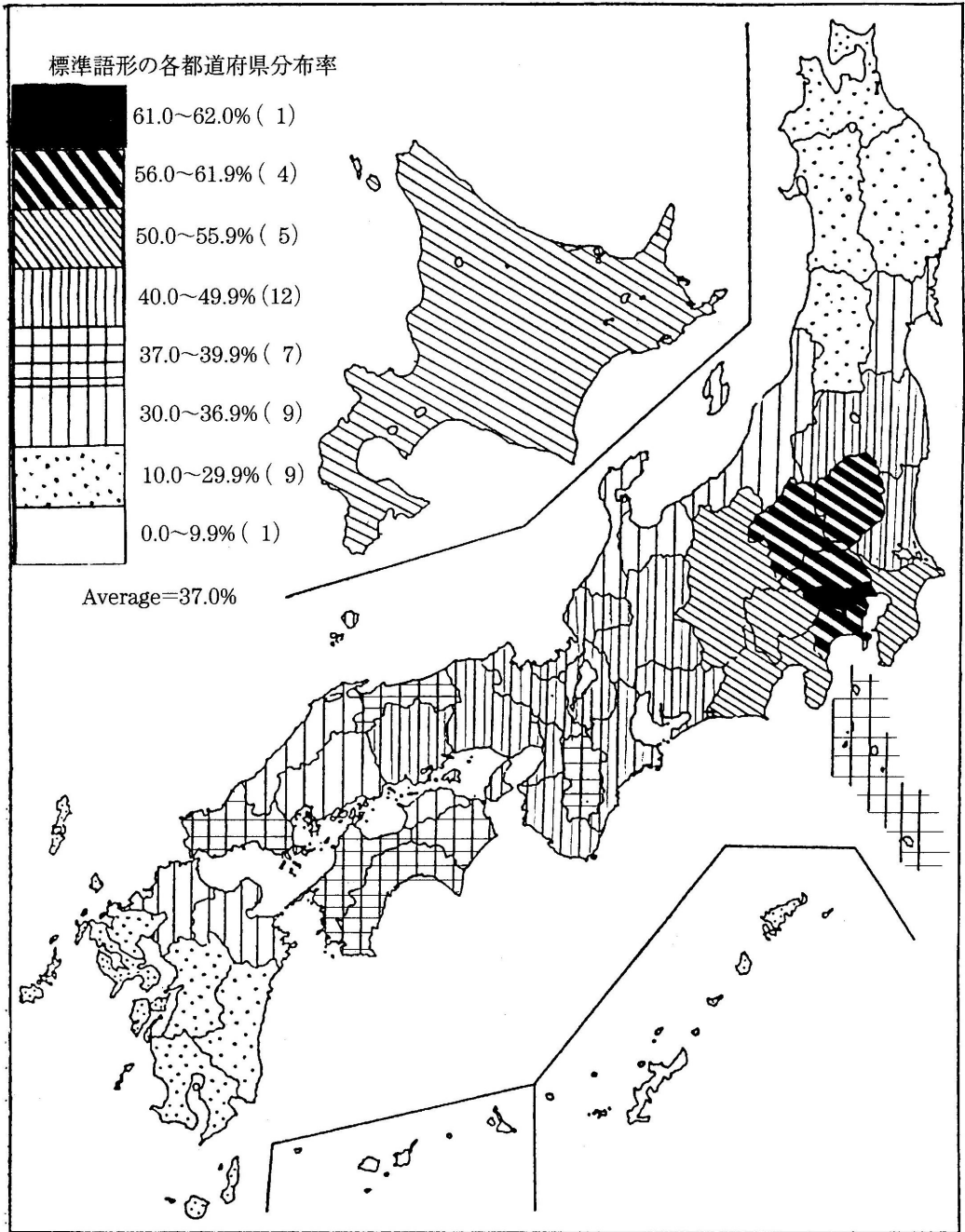
Thus the relatively small diversity of eastern Japan can be explained by the relatively shorter period of time Japanese was spoken by its inhabitants. On the other hand the great diversity observed in the Okinawan islands can be explained by barriers (or scarcity of communication) between the islands and also by the later formation of the Ryukyu Kingdom in the middle ages of Japan.

GENERAL PATTERN OF DIALECTAL DIFFERENCES FROM KASAI DATA

First I will give an overview of the Japanese dialects. The dialectal distribution of Japanese can be identified in LAJ or "Linguistic Atlas of Japan" (NLRI 1966-1974). However, there are as many as 300 maps in the Atlas, so it is difficult to see the overall pattern at a glance. There is a database which can summarily show the general tendency of distribution of the Japanese dialects. This computational data, compiled by Ms. Kasai, shows ratios of standard Japanese forms for 82 selected words from the "Linguistic Atlas of Japan". Average degrees of standard forms were calculated for each linguistic map for 48 prefectures (Tokyo was divided into 2, namely mainland and seven Izu Islands).

Figure 1 shows the geographical distribution of the Kasai data. The prefectures near Tokyo use more standard Japanese, and prefectures at both ends of the Japanese Islands use less standard Japanese. It clearly shows that average ratio of standard Japanese forms is in inverse correlation to geographical distance from Tokyo. Results of some multidimensional techniques showed that there are actually two centers of diffusion of standard Japanese, namely eastern modern capital, Tokyo, and western old capital, Kyoto. But nowadays, the western cultural center in Kyoto does not have enough power or influence over the eastern half of Japan, so that calculation from Tokyo is enough to explain the geographical distribution as a whole. This tendency coincides with ordinary people's consciousness or folk knowledge about Japanese dialects: the Tohoku dialects of eastern Japan and the Kyushu dialects of western Japan are both acknowledged as quite different and hard to understand. There are also statistical data on the phonological and grammatical differences of dialects. They also show a similar pattern; more standard near Tokyo, and conspicuous differences at both ends of the Japanese Islands.

These data show the degrees or ratio of standard forms. Comparison with the first recorded instance (or appearance) of the words in the old documents showed that some standard Japanese forms were already in usage in the 8th cen-



河西1981(言語生活354)による

Fig. 1 Ratio of average usage of standard Japanese forms by prefectures (Kansai 1981)

ture (Nara Era) when the Japanese language was amply recorded in the documents. These forms of early usage are mostly basic words with high frequency of usage, and they are used widely all over Japan even now. This fact shows that coincidence of dialectal forms with the standard Japanese is not only due to recent standardization in the modern ages, but due to long historical relationships with standard forms used in the cultural center of Japan.

ISOLATED FORMS IN LINGUISTIC ATLAS DATA

The so-called isolated form is a dialectal word which is found only in one locality in a linguistic geographical survey of all Japan. This term developed in philology, where an isolated form is a word which appears only once in all historical documents of a language. The same idea can be applied to the dialect distribution data. My colleague Sawaki computerized data from the Atlas and picked up dialectal isolated forms from about 300 maps (Sawaki 1988).

Figure 2 shows the geographical distribution of the isolated forms made by Sawaki. The dots show the localities where more than three isolated forms are found. The sizes and types of the symbols show the numbers of isolated forms reported at the respective localities. As shown by the map, several geographical tendencies can be found.

(1) More isolated forms are found in western Japan than in eastern Japan.

(2) More isolated forms are found in remote areas or "relic areas" of the Japanese Islands, and only a few isolated forms are found in central Japan, that is near Tokyo, Kyoto and Osaka.

(3) Islands, especially remote Southwestern or Okinawan Islands, show many isolated forms.

PRINCIPLES OF GEOGRAPHICAL HISTORICAL LINGUISTICS

The tendencies above can be explained by some general geographical principles of historical linguistics. The following principles have hitherto been advocated.

(1) **HABITATION:** The longer the ages of habitation, the greater the divergence of dialects. This is exemplified by the geographical diversity of English in England and the homogeneity of English in areas outside Great Britain where English is spoken. A corollary of this principle is that territories acquired by conquest or invasion show small linguistic differences.

(2) **ISOLATION:** The greater the barriers of communication, the greater the divergence of dialects. Mountains, ocean and large rivers sometimes work as natural barriers. This is typically shown in Europe, by diversity near the Alps and simplicity in the flat plains, both in French and in German. Dialects in remote is-

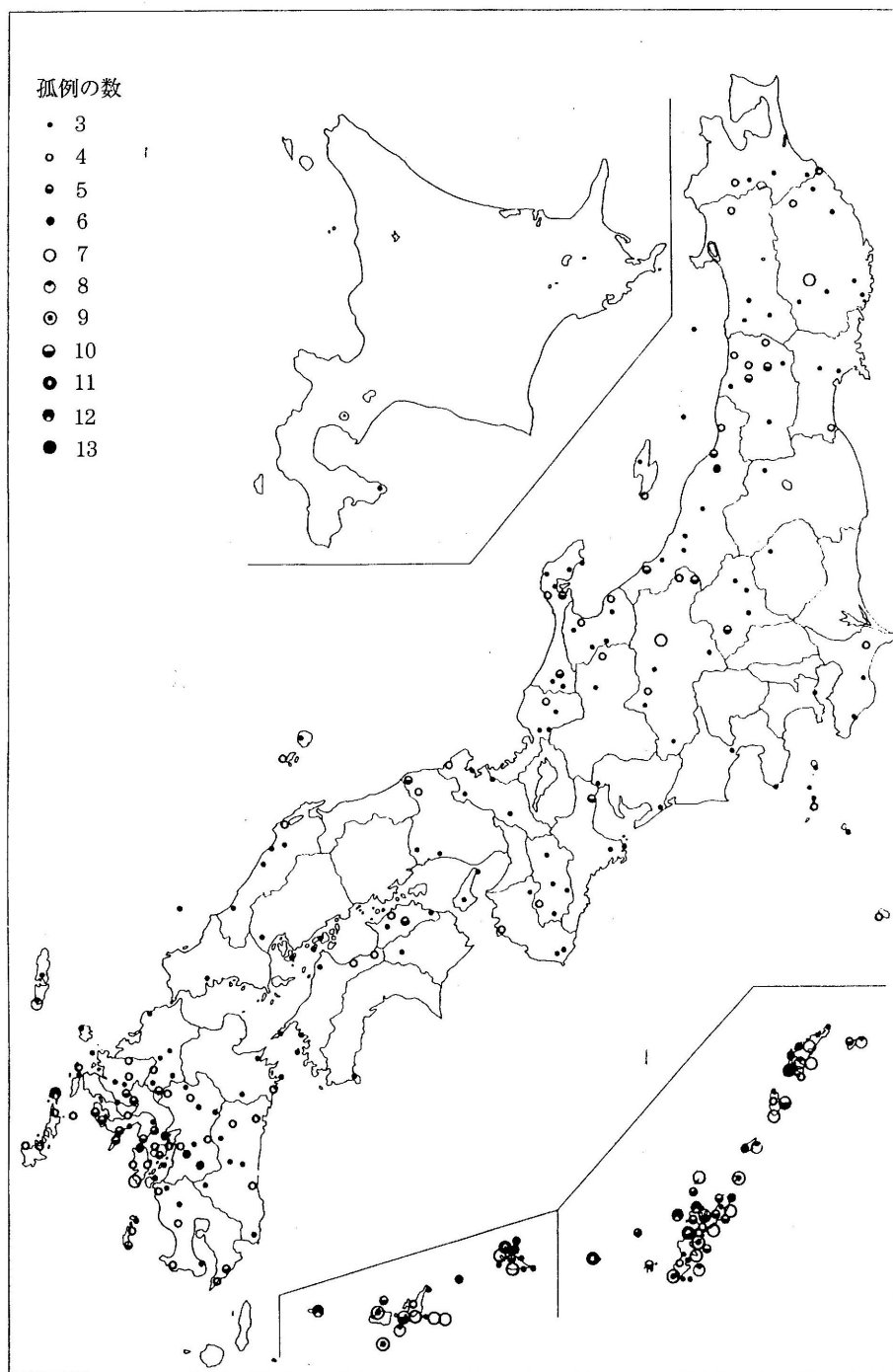


Fig. 2 Distribution of localities with more than two isolated forms (Sawaki 1993)

lands often become quite different from the mainland. This tendency is utilized in a technique called lexico-statistics or glottochronology (Swadesh 1972), which is based on an idea that basic words change according to a certain ratio as time passes.

(3) **CENTRALIZATION**: Not only natural but humanistic elements also influence linguistic diversification. Centralization of government, development of transportation and mass communication etc. encourage the integration of dialects. This is observed typically in the relatively great diversity in German and Italian compared with less diversity in French where centralization of power was established by French authority.

(3') **STANDARDIZATION**: The recent language standardization works for the unification of linguistic diversification. Unification is caused by the modernization of society (development of education, administration, transportation and so on), and also through the recent development of mass communication.

The principles above can be unified in one general principle as follows.

(4) **COMMUNICATION**: The geographical diversity is in general in inverse correlation with the density of communication within the area.

EXPLANATION OF DISTRIBUTION OF ISOLATED FORMS

In order to explain the geographical tendency of the isolated forms found in the data of the "Linguistic Atlas of Japan", the above general principles can be utilized.

In this paper I would like to advocate that the principle of **HABITATION** worked fundamentally to form this geographical distribution of isolated forms. Thus I will first try to explain the distribution without utilizing this principle. If some phenomena remain and are later explained by the **HABITATION** principle, the adequacy of the **HABITATION** principle will be proved.

Density of isolated forms in the Southwestern Islands (Okinawan Islands) seem to be explained by **ISOLATION**. The islands there are big enough for self-sufficiency, and people could live without communication with other islands. However, there are also islands in the Seto Inland Sea, the Japan Sea and the Pacific Ocean. Islands in the northern Japan Sea do not report many isolated forms. This cannot be explained by **ISOLATION**. Another principle, **HABITATION** seems to have worked here. The northern islands seem to have been inhabited by Japanese people later in history, as will be discussed later.

Diversity in Okinawa may also be explained by **CENTRALIZATION**. Establishment of feudal power was formed later around 10th or 11th century in Okinawa, and governmental system of centralization was not attained completely in the remote islands.

As for the fact that more isolated forms were found in remote or relic areas (or less isolated forms are found in central Japan), the influence of language STANDARDIZATION in modern Japan after the Meiji Restoration may be responsible. But this factor cannot solely explain the difference between Eastern and Western Japan (especially Tohoku and Kyushu), as will be shown later.

As for the fact that more isolated forms were found in southern Japan (Kyushu), the principle of STANDARDIZATION apparently can explain the pattern, because isolated forms were rarely observed near the modern cultural and linguistic center Tokyo. However, if this tendency of distribution can be explained by STANDARDIZATION, distribution of isolated forms should show a correlation with other geographical distribution of standardization. As will be shown in the next section, distribution of the isolated forms and standardization do not coincide completely. Thus another principle should be taken into consideration, that is the differences in the length of HABITATION.

Thus far, the isolated forms were observed in the map form which shows each locality. The overall tendency of geographical distribution can be summa-

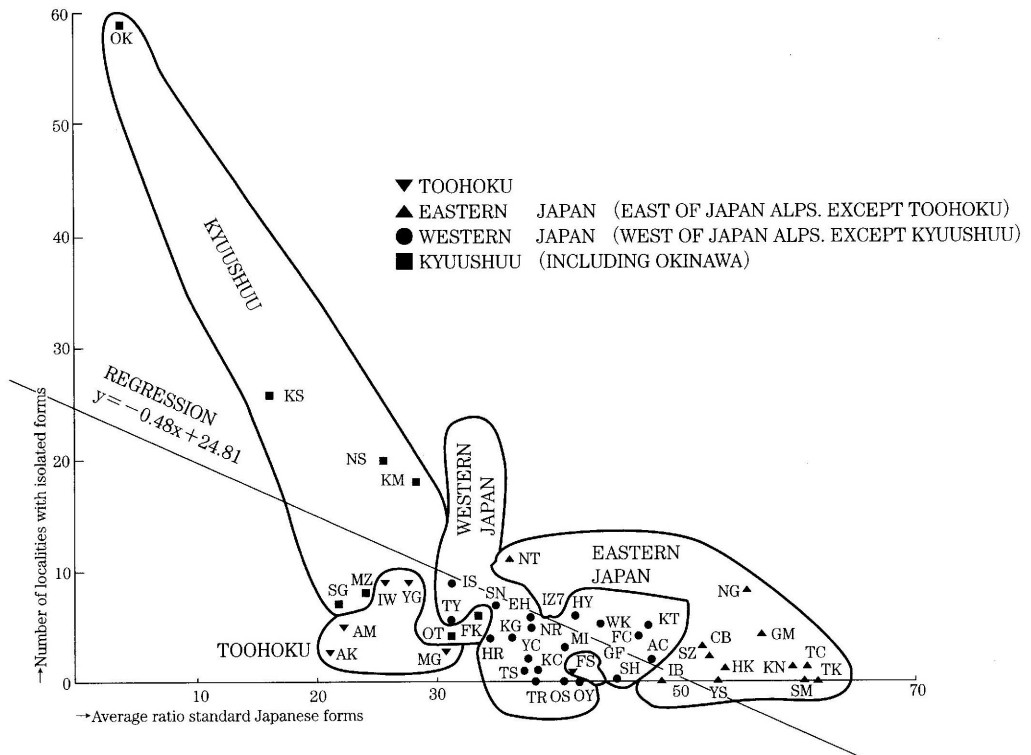


Fig. 3 Average ration of standard Japanese forms and Number of localities with isolated forms

alized by calculating numbers of localities per prefecture where the isolated forms were reported.

ISOLATED FORMS AND DEGREES OF STANDARDIZATION

According to the principle of STANDARDIZATION, the degrees of standardization of the Kasai data and the numbers of isolated forms should show an inverse correlation.

Figure 3 shows the correlation of the two factors. Average ratio of standard Japanese forms of the Kasai data are shown on the horizontal axis, and number of localities where isolated forms were found in Sawaki data are plotted on the vertical axis. When these data were compared, the difference between Eastern and Western Japan became conspicuous.

The diagonal or slanted line in Figure 3 shows the regression line as a result of regression analysis by the method of least squares for all the prefectures. Ideally the percentage of standard Japanese forms is in inverse correlation with the numbers of localities with isolated forms. Thus the regression line in Figure 3 agrees with our expectation.

Only the behavior of the Tohoku dialects of northern Japan is exceptional. The Tohoku dialects are detached from other eastern dialects in Figure 3. The Tohoku dialects are low in the ratio of the standardized forms, but they do not show many localities with isolated forms. The Kyushu dialects of western Japan show similar degrees of standardization to the Tohoku dialects, but they show many localities with isolated forms.

The contrast between the Tohoku and Kyushu dialects is observed in different kinds of dialectological surveys. Grammatical data showed that the Kyushu dialects are diverse among themselves, while the Tohoku dialects are similar among themselves.

Thus, it is not appropriate to explain the contrast of Eastern and Western Japan by the STANDARDIZATION principle alone. Other principles of ISOLATION and CENTRALIZATION cannot explain the east-west contrast of Japan either.

As for the factors which may be related to the ISOLATION principle, there are no conspicuous differences in isolation of localities or feudal territories of Japan. Furthermore, as for the CENTRALIZATION principle, the difference of centralization in the feudal territories in the Edo period (from 1603 to 1868) is rather a contrast of central and peripheral Japan, not a contrast of east and west. In central Japan near Kyoto and Edo (later Tokyo), the land was generally divided into small territories, and directly governed by the Tokugawa shogunate. In contrast to this, great feudal lords governed huge territories in the peripheral ar-

eas, especially the northern and southern ends of Japan (Tohoku and Kyushu). In the huge territories, some peculiarities of dialects developed inside during the several centuries of the feudal ages. At the same time, homogenization of dialects within the territory was established through the strong cultural influence from the local territorial centers. However, there are no conspicuous differences between the eastern and western peripheries of Japan: the feudal territories in both areas developed their own peculiarities.

Thus, the east-west contrast between the Tohoku and the Kyushu dialects must be explained by the HABITATION principle. In the next chapter we will see that the lengths of habitation of Japanese speaking people are different in Eastern and Western Japan.

HISTORICAL GEOGRAPHICAL BACKGROUND OF THE JAPANESE LANGUAGE

It has recently become widely acknowledged that people of Jomon culture once covered almost all of Japan in the remote past, and that people of Yayoi culture moved eastward from northern Kyushu, and covered Honshu Island in the ensuing several centuries.

Classical theory advocated by Philipp Franz von Siebold who came to Japan before the modernization was recently revived. According to the recent theory advocated by Hanihara (1991), present-day Japanese people are mostly descendants of Yayoi people, the so-called neo-Mongoloid, and Ainu people are descendants of Jomon people, referred to as proto-Mongoloid. By adopting this "dual structure model", eastward movement of culture continuing for more than two millennia can be explained systematically. It is quite reasonable that people of both Jomon culture and Yayoi culture lived peacefully side by side for many centuries in northern Japan. Coexistence of more than one language has been observed in many parts of the world for many centuries. Thus it is difficult to say in what century Japanese language reached certain parts of northern Japan. But it is safe to say that northern Japan has a shorter history of speaking Japanese language. Then, contrast of east and west can be explained by the length of HABITATION of the Japanese speaking people. Incidentally, this eastward movement of Japanese language is somewhat similar to northward extension of English language in Great Britain.

Both people and their culture moved eastward. This eastward movement is perhaps connected with the formation and diffusion of Japanese language. The archaeological and historical data show that the people with Yayoi culture began living in southern Japan in the 2nd or 3rd centuries BC, and reached northern Japan many centuries later.

It is common sense that language is independent from technology, culture,

nation and race. According to recent excavations, technology of rice production diffused quite early up to the northern tip of Honshu Island. Yayoi earthenware are also sporadically found in eastern Japan. Yet, this does not directly mean that language spoken by people of Yayoi culture reached eastern Japan at the same time.

People in northern Japan may have adopted the technology of rice production and the Yayoi pottery while keeping their ancestral Jomon language. The latest consensus is that the political power or administration system of Yamato Imperial Court reached northern Japan very late in 7th or 8th century AD. This would suggest that Japanese language must have surely been established in northern Japan, by this time. Still, old Jomon elements are found in northern Japan. Archaeological artifacts of Jomon culture lingered until late in northern Japan. Morphological characteristics of proto-Mongoloid people are found in northern Japan and Southwestern Islands even today.

There is still another possibility that Japanese language had been spoken in northern Japan before the invasion of Yamato Imperial Court. People may have adopted a new language when they accepted the Yayoi culture. The exact time of adoption of Japanese language in northern Japan cannot be established, but it is certain that northern Japan adopted Japanese language quite late in history.

The enigma of the formation of Japanese language is a favorite topic of Japanese people and has been discussed for many decades. Owing to scarce sources showing historical relationship with other languages, there appeared various arguments for the formation or genealogy of Japanese language. Many scholars, especially Japanese scholars, argue that Japanese is formed through contact or mixture of two languages. Other scholars, mainly foreign scholars, argue that Japanese is remotely related to Korean and other Altaic languages. However, most scholars seem to agree that the ancestors of the present-day Japanese language are connected with the people of the Yayoi culture.

PROBLEMS OF PREHISTORY OF JAPANESE

Japanese language is a rare isolated language which has no sister language though it has many speakers. The neighboring language, Korean, shows many typological similarities in grammar, but similarities of lexical items are not abundant enough to prove a systematic historical relationship between the two languages.

Lexico-statistical or glottochronological studies have shown that Japanese language may have diverged from Korean language around 5th to 3rd century BC.

Some scholars argue that a language which shows similarities to both lan-

guages must have existed in the southern part of Korean Peninsula in the past, and that the language disappeared under the pressure of Korean language which entered from the north. But this hypothesis does not prove that Japanese and Korean are sister languages diverging from one ancestral proto-language.

Despite these obstacles, Japanese language seems to have diverged from the Proto-Japano-Korean language and diffused from the southern part of Kyushu Island to the other parts of Japan. This eastward movement has been observed in many facets of culture for a long time in Japanese history. According to this "double structure hypothesis", Japanese dialects must have diverged after diffusion to and settlement in various parts of Japan. The length of HABITATION is different for many parts of the Japanese Islands. Diversification of dialects has thus been different according to areas.

HISTORICAL DOCUMENTS FOR DIALECT FORMATION

Japanese dialects in the past are recorded in various documents. The dialects of eastern Japan were recorded in verse form in Chinese characters as early as in 8th century. These dialectal verses were recorded in "Manyoo-shuu" perhaps in order to show the outside world that Yamato Imperial Court had conquered a new territory which was dialectally different and culturally exotic. Conspicuous phonological and grammatical differences can be found in the verses. However, as unrecognizable expressions seem to have been avoided when compiling the "Manyoo-shuu", exact degrees of dialectal differences are not known. Yet, when compared with the dialectal peculiarities in southern Japan recorded in 17th century, the peculiarities of eastern territories are not so great. Verses of northern Japan, or present day Tohoku district, were not recorded in the document. In the 8th century, the northern part of Japan was still considered a newly acquired territory just conquered by the Yamato Imperial Court forces. Historical documents sometimes relate that people from eastern Japan were moved (implanted) to northern Japan as pioneers in order to develop the new territory. This shows that dialectal peculiarities were still few and developed later.

In the beginning of 17th century, a Christian missionary made a voluminous book on Japanese grammar from the standpoint of foreigners making use of Japanese to propagate Christianity, and described several characteristics of Japanese dialects. According to the description, dialectal characteristics of southern Japan were great, and some peculiarities are still found today in older people's language. It is interesting that no mention was made of the dialect of the Kagoshima area, the southern tip of Kyushu, although it is the place where the first Christian missionary Francisco Xavier landed and where his faithful guide and interpreter was born. The lack of description may mean that dialectal peculiarities

were not yet developed fully at that time.

Later, important dialectal documents were made by drifting fishermen to the Russian territory in 18th and 19th centuries, whose languages were recorded in Russian letters (Murayama 1985). The dialect of a fisherman from Kagoshima, or the southernmost Prefecture in Kyushu Island, was only a little different from the present dialect. This shows that the characteristics of Kagoshima dialect developed in the last half of the Edo era after the drifting of the fisherman. At about the same time, another fisherman from the northern tip of Honshu Island drifted and his language was also recorded. His dialect is quite similar to the present northern dialect. Local peculiarities hardly appeared, so that even his birthplace was difficult to determine on the basis of his dialect alone. Discovery of his tombstone was decisive for his birthplace. It shows that dialectal characteristics developed during the feudal ages in northern Japan.

The historical data above can be interpreted as showing the development of dialectal peculiarities during the feudal ages. Earlier evidence shows that dialectal peculiarities did not develop in the northern tip of Japan. It must be because of the relatively shorter history of Japanese language spoken there.

OTHER EVIDENCES FOR AINU LANGUAGE SPOKEN IN NORTHERN JAPAN

Later eastward movement of language can be observed through historical documents as well.

People speaking Japanese language, or *Wajin*, began to live in Hokkaido Island around 15th century, and diffused gradually to the north along the seashore. At the same time there remained speakers of Ainu language in the northern tip of Honshu Island according to the records of a traveler writer, Masumi SUGAE. This shows that expulsion of aboriginal Ainu language proceeded gradually for centuries. The process of promulgation of the newer (conqueror) Japanese language must have been an inverse process, and must have proceeded gradually for centuries. There may have been isolated areas of the Ainu language in some remote parts of Honshu Island in the past.

After the Meiji Restoration of 1868, modern Japan sent soldier-farmers into inland Hokkaido. Also Japanese language education was forced on Ainu children through the modernized school system. Owing to this newer mechanism of integration, there are at present only a few speakers of Ainu left in Hokkaido. There recently began a movement for teaching Ainu language to young pre-school children, and it has had certain positive results. However these children tend to forget the Ainu language later in life just because there is no economical impetus for continuing to speak the aboriginal language.

Vestiges or remnants of Ainu language can still be observed in place names.

Place names of Hokkaido are full of Ainu words. Though they are mostly written in Chinese characters, they have Ainu etymology. Visitors to the region will notice that there are many place names ending with *-betsu*, *-petsu* or *-nai*. These roots are from Ainu words meaning 'river'. Place names of Ainu origin are also found in the northern Honshu area. Place names with elements of *-betsu*, *-petsu* or *-nai* are found mainly in the northern tip of Honshu, namely the three prefectures of Aomori, Iwate and Akita. This phenomenon reminds me of a remark about European place names having a tendency to keep hydronyms (place names of water or river) given by aboriginal people (Krahe 1954).

This dense distribution can be explained by the later acquisition of these areas by the conquering Yamato Imperial Court. Until the 8th century a government ordinance was repeatedly issued regarding the usage of Chinese characters (or spellings) in place names. It decreed that a place name should be spelled by two Chinese characters (following the Chinese custom) with good and happy meanings. Place names of Ainu origin may have been avoided and new names with Japanese roots may have been given in most of Japan as is found even now. However, after the late conquest of the northern tip of Honshu Island, the government ordinance seems to have lost its effect, thus leaving many names with Ainu origin until present.

CONCLUSION

Thus far, the relatively small diversity of dialect in northern Japan was explained by a relatively short history of Japanese language spoken there.

However this kind of explanation by ages of HABITATION cannot easily be applied to the southern tip of Japan. There is still controversy as to when people of the Southwestern islands accepted Japanese language. At least there are documents showing that these islands sent messengers to the Yamato Imperial Court in 7th or 8th century. At that time they had to hire interpreters in order to communicate. Recently some scholars have argued that some kind of Austronesian language may have been spoken before Japanese language was introduced to these islands.

Regardless, the history of Japanese language in southwestern Islands is as short as it is in northern Honshu. However, there are many isolated forms in these islands as was shown in Figure 2.

The great diversity in the islands can be explained by ISOLATION or barriers (or scarcity) of transportation between the islands and also by later formation of Ryukyu Kingdom in the middle ages of Japan.

In conclusion, the explanation I have outlined in this paper based on the length of HABITATION is not logical proof, but only an attempt at the most plau-

sible explanation on the basis of a hypothesis which had already been advocated by respected anthropologists. In order to prove the HABITATION hypothesis, further enumeration of all the other possibilities and their rejection is necessary.

One another explanation which should not be overlooked is the possibility of expulsion of isolated forms near the cultural center of Tokyo before modernization of Japan. The westernmost prefectures Okinawa, Kagoshima, Kumamoto and Nagasaki show an exceptionally high frequency of isolated forms as shown in Figure 3. When compared with these western prefectures, all the other prefectures in Japan have only a few localities with isolated forms.

Language standardization after the modernization of Japan was not enough to explain this geographical tendency. However, if we suppose that the language integration process had been already in action before modernization, that is in the Edo era, these geographical differences in the frequencies of isolated forms can be explained.

In order to determine the relative plausibility of these possibilities, we should add more computational dialectal data. Methodological comparison with other language seems also interesting and fruitful.

ADDENDA after the symposium

(1) The items (words) processed by Sawaki were taken from Volume 3 of "Linguistic Atlas of Japan", whose items are concerned with human body and child's play, e.g. head, whirl of hair on the head, bald head, ... eye, eyebrow, sty, ... birthmark, ... man, woman, ... kite, ... hide-and-seek, etc. The frequency of usage in documents of these words varies. Both the basic words and words rarely used are investigated, so that they can roughly represent many types of geographical diversification of Japanese.

(2) To be impartial I should add here that isolated forms of grammatical data showed a rather contradictory result, with many isolated forms reported in the northern part of Honshu Island, according to the latest work by Sawaki (1992). However, according to my own data which are based on a preliminary study of grammatical distribution, isolated forms appeared in remote islands of Okinawa and Hachijo, and did not appear in northern Japan (Inoue 1996). There are still problems in the quality and quantity of the data, and we should wait for future efforts for calculating and quantifying the geographical diversification of language. We should continue this kind of study by having more computational dialectal data in hand.

(3) A paper by Kumagai (1996) read after this conference in Kyoto showed that the overall distribution of (standard and non-standard) forms of all the items of the same data with Sawaki (1992) is mostly dominated by geographical dis-

tance from Tokyo. Though the geographical distribution observed in “Linguistic Atlas of Japan” is a reflection of pre-modern dialectal distribution, the standard Japanese forms which disseminated from Tokyo or Kyoto seem to be decisive in contributing to the overall pattern of Japanese dialects.

(4) This paper is a condensed version of the Inoue (1992). The sections on history of Japanese dialects were added later. Inoue (1992) was cited and favorably referenced in Hudson (1994).

BIBLIOGRAPHY

- Hanihara, K. (1991) Dual structure model for the population history of the Japanese, *Japan Review* 2:1-33.
- Hudson, M. (1994) The linguistic prehistory of Japan: Some archaeological speculations, *Anthropological Sciences* 102-3 231-255.
- Inoue, F. (1995). Classification of dialects by image—English and Japanese. *Proceedings of the First International Congress of Dialectologists* Vol. 4, (Franz Steiner).
- Inoue, F. (1992). Hoogen no tayoosei to Nihon bunka no nagare—Korei no bunpu to Ainu-go kiso—Variability of dialects and trends of Japanese culture—Distribution of isolated forms and Ainu substratum—. *Nihongogaku* 11-3: 57-67.
- Inoue, F. (1996). Computational Dialectology (1)(2). *Area and Culture Studies* 52 & 53.
- Inoue, F. & Kasai, H. (1989). Dialect Classification by Standard Japanese Forms in S. Mizutani (ed.) *Japanese Quantitative Linguistics (Quantitative Linguistics Vol. 39)*(Bochum).
- Krahe, H. (1954) *Sprache und Vorzeit*, Heidelberg.
- Kunagai, Y. (1996) Nettowaaku-hoo ni yoru "Nihon Gengo Chizu Dai 3 kan" no chiten-kan ruijido no sokutei to deeta no shikakuka (Measurement of similarity among localities and visualization of data of the "Linguistic Atlas of Japan Vol. 3" by means of network method) *Nihon Hoogen Kenkyukai Happyoo Genkooshuu* 63.
- Murayama, S. (1985) *Shin-surabu-go Nihongo Jiten*. (Gonza's New Slavonic-Japanese Lexicon) Tokyo: Nauka Shoten.
- NLRI (National Language Research Institute) (1966-1974) *Linguistic Atlas of Japan* (Ookurashoo Insatsukyoku)
- Sawaki, Motoei (1988) "Nihon gengo chizu" no gokei no sunryoo tcki seikaku" (Quantitative characteristics of word forms of "Linguistic Atlas of Japan"). *Hoogen Kenkyuuhoo no Tansaku* (National Language Institute, Shuuei Shuppan)
- Sawaki, Motoei (1992) "Hoogen bunpoo zenkoku chizu" no "shiryoo ichiran" to sono riyoo ("Data Synopsis" of "Grammatical Atlas of Japan" and its utilization) *Nihongogaku* 11-6: 59-69.
- Swadesh, M. (1972) *The Origin and Diversification of Language* London: Routledge & Kegan Paul.