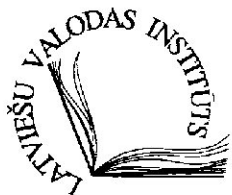




**Proceedings of the 4th
International Congress of
Dialectologists and
Geolinguists**

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Geographical Distance Center and Rate of Diffusion of Standard Japanese

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1. Theoretical considerations – two simplifications

In this paper a new technique for representing dialectal differences will be introduced. Two techniques of simplification will be attempted to represent geographical distribution patterns of standard Japanese. The first one is a representation of two-dimensional geographical distribution patterns by one dimension on a sheet of paper. The second one is plotting the geographical locations making use of railway distances from cultural centers. By simplifying the two-dimensional geographical distribution into one by railway distance, another dimension on a sheet of paper can show something else to be compared. In this study, the dimension from top to bottom is utilized to show the average percentage of usage of standard Japanese forms for each prefecture.

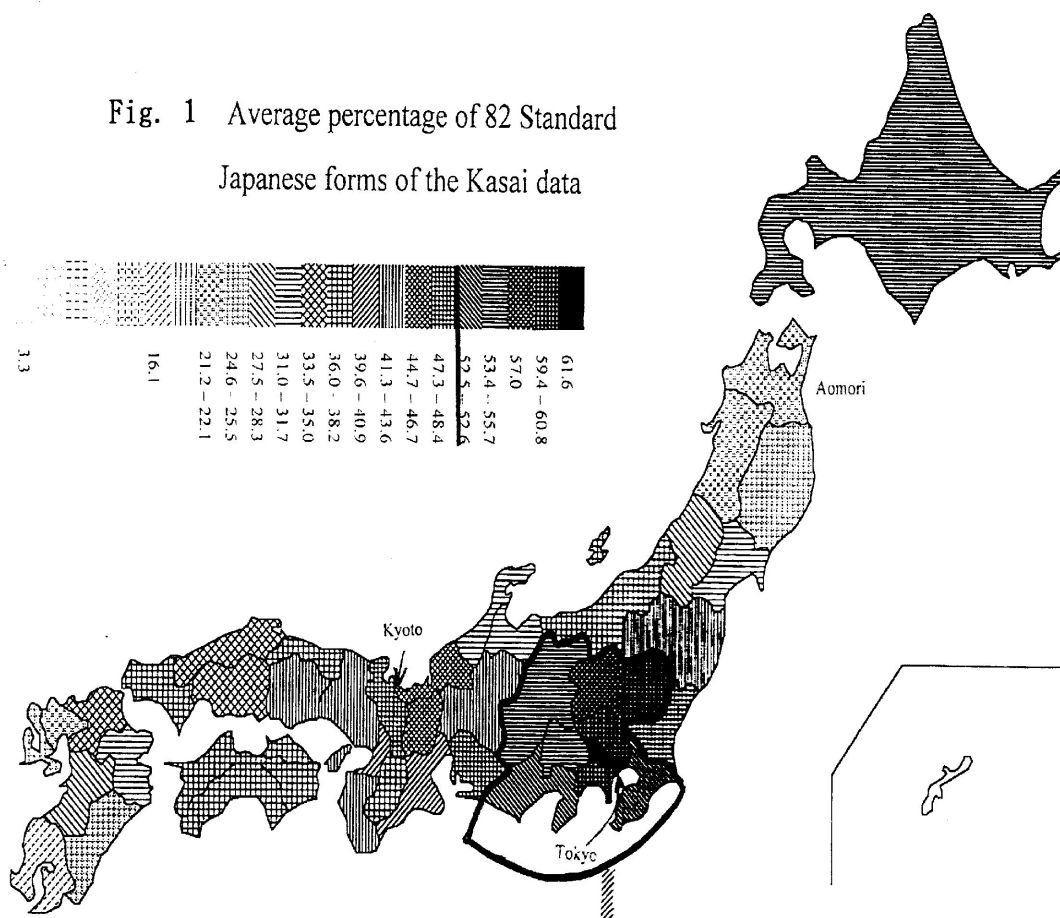
The interrelationship of the two factors, that is, geographical distances from the cultural centers and percentage of standard Japanese forms, can be compared in the form of scattergrams. By comparing railway distances from Tokyo and from Kyoto, the degree of linguistic influence of each of the capitals of Japan was analyzed. Although the linguistic influence of the old capital, Kyoto, has often been neglected, it still leaves traces in standardized words in many places throughout Japan.

In order to see the basic patterns of distribution of the Japanese standard forms, "Kasai data", or numerical data of the "Linguistic Atlas of Japan", was utilized by applying the following techniques. Kasai data is computer-readable matrix data showing the percentage of usage in 47 prefectures and one insular area (Izu), of 82 representative words taken from the "Linguistic Atlas of Japan". There were 2400 informants for this Atlas and the data of these informants was simplified to obtain average values for each area. Discussion concerning the lines of the Kasai data matrix, that is, the 82 words, has been the main topic of presentation at international congresses so far. However, in this study the columns of prefectures (as shown in Table 1) are analyzed. The railway distances are shown at the bottom of the matrix. This topic is more suitable for geolinguistics than for dialectology in the classical sense.

	Hokkaido	Aomori	Tokyo	Kyoto	Hyogo	Okinawa	first appearance
Mabushii	28.5	6.8	88.9	11.1	11.2	0.0	1550
Kogekusai	95.2	58.1	100.0	97.2	87.3	0.0	1601
Nasu	15.4	0.0	100.0	18.8	18.2	0.0	1483
Tsuyu	39.8	0.0	22.2	100.0	98.6	0.0	1401
Railway distance from Tokyo	1179	739	0	514	590	3242	

Table 1: A part of the Matrix of the Kasai data

Fig. 1 Average percentage of 82 Standard Japanese forms of the Kasai data



The basic patterns of the Kasai data can be shown on maps. There are 82 maps (one for each word), showing the percentage for 48 prefectural areas. However, observing 82 maps is troublesome and time consuming, and therefore a general map showing the average percentage of usage of the 82 words is shown in Figure 1. This map shows the percentages in great detail making use of various patterns. The degrees of usage of standard forms are divided into about 20 intervals between 62% for Tokyo and 3% for Okinawa. It has been designed so that the general darkness corresponds to a higher percentage.

The present capital, Tokyo, has the highest percentage of standard Japanese forms, and the surrounding prefectures are also generally high in standard language. More minute observation shows that percentages for western prefectures near Kyoto, that is the old capital, are a little higher than the prefectures lying between the two capitals. This relation was not easily read in the past from maps, which were drawn boldly cutting the values into only four intervals. At that time, scholars were mainly interested in the contrast between language in western and eastern Japan.

Railway distance is utilized in this analysis. Figure 2 (above) of the average percentage of standard forms suggests that standardization is correlated with distance from Tokyo. Although there are various techniques for measuring geographical distance, in this study railway distances

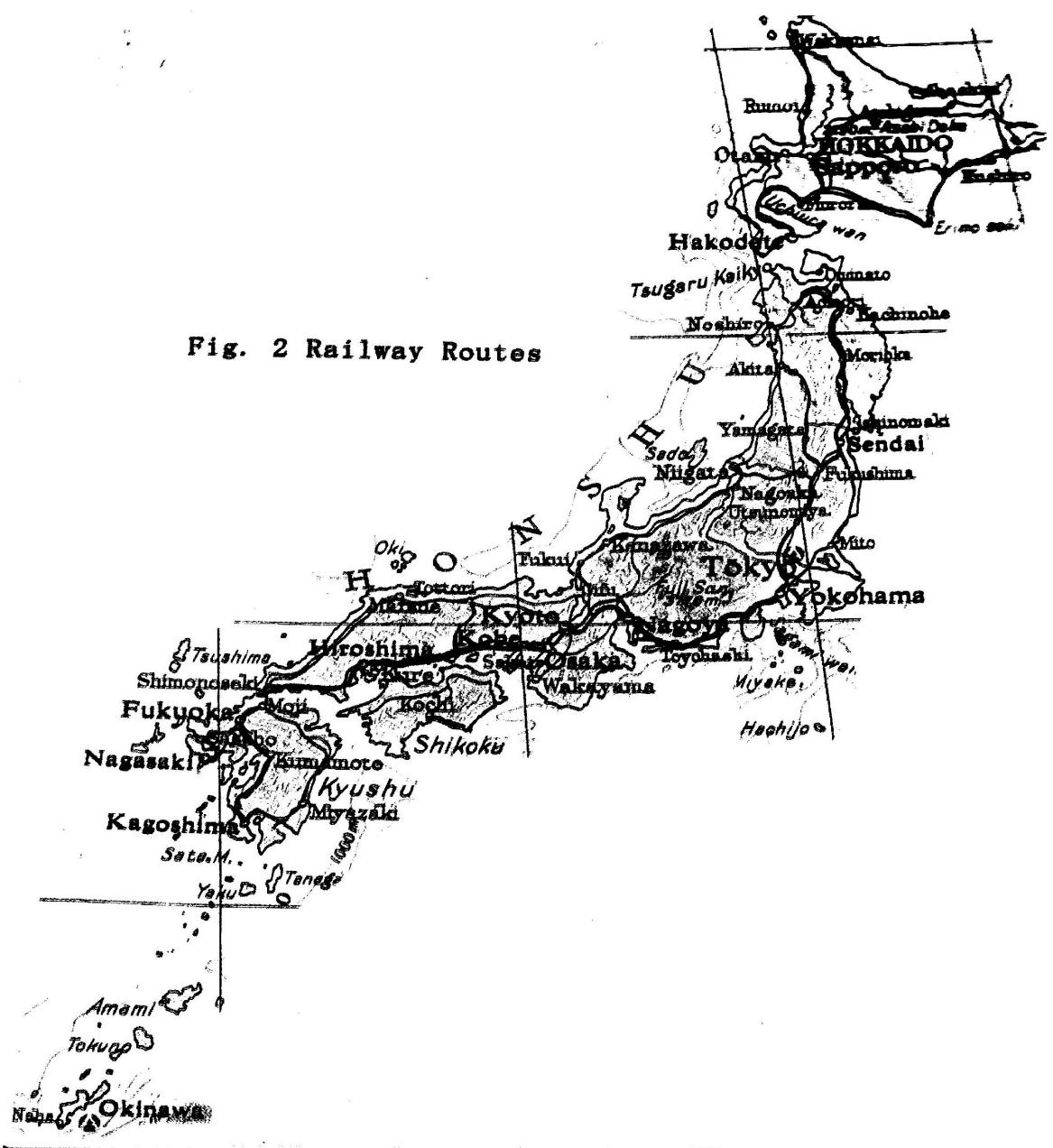


Fig. 2 Railway Routes

were utilized by calculating the distance between Tokyo station and the stations of the political centers of prefectures (the cities where the prefectural offices are situated). They are called "prefecture centers" in this presentation. Figure 2 shows the railway networks of the past, at approximately the time when the informants of the "Linguistic Atlas of Japan" were surveyed. Most of the routes connecting prefecture centers are main routes of the railway system. In order to compare these results with dialect diffusion in the past, railway distances from the old capital of Kyoto were also calculated. In this presentation, railway distances from Tokyo will be discussed first, followed by railway distances from Kyoto.

2. Railway distances from Tokyo

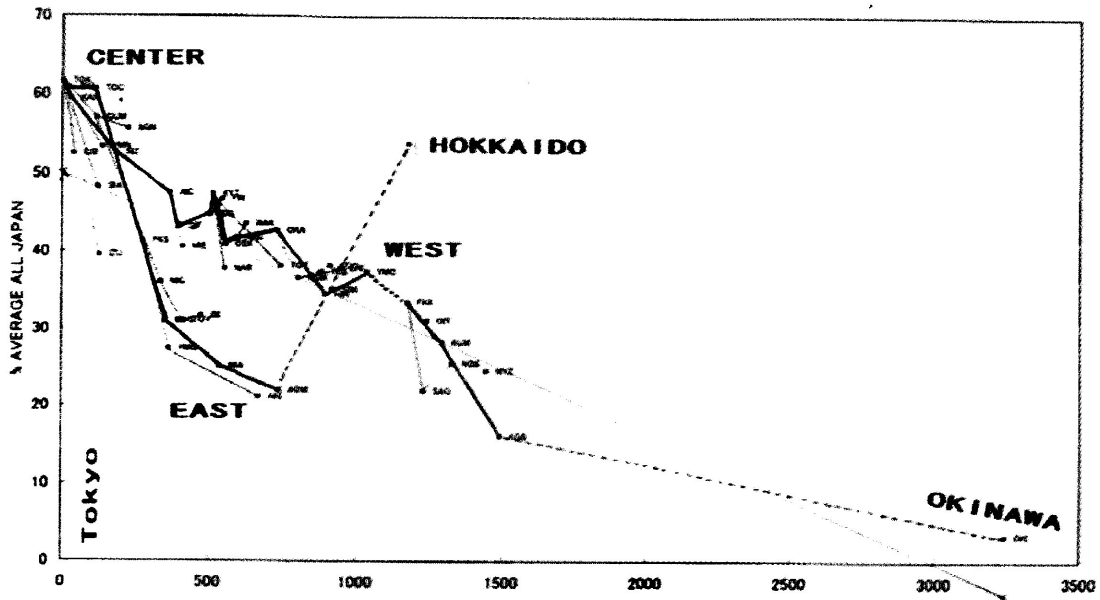


Fig. 3 Railway Distance from Tokyo and standardization with Hokkaido and Okinawa

Figure 3 is a general graph of all the prefectures showing railway distances from Tokyo. The vertical axis shows the average usage rate of the standard Japanese words of the Kasai data. The horizontal axis shows the railway distances by kilometers from Tokyo to prefecture centers. These distances were calculated from the official timetable of Japan National Railways used in the 1980's. The distances to islands are actual geographical distances by ship. In Figure 3 the prefecture centers are connected by lines following the nearest main railway routes from the centers to Tokyo. Sea routes are connected by dotted lines.

Many prefectures are beautifully plotted from the top left-hand side to the bottom right-hand side. This graph shows that railway distances from Tokyo are a useful means of showing the clear correlation between geographical location and language standardization. Tokyo is the peak of language standardization, and the use of standard forms decreases as the prefectures are situated further from Tokyo. However, there are two extreme exceptions: Okinawa and Hokkaido. Okinawa is situated far south-east of mainland Japan, and was once the independent kingdom of Ryukyu. The dialects in the islands diverged so much that mutual intelligibility became almost impossible, even with the nearest neighboring island north-east of Ryukyu. The speech of the Okinawan Islands is thus an independent language, from the standpoint of both linguistics and sociolinguistics. Hokkaido is the northern island and was a frontier for the Japanese language in that Japanese people migrated there mostly after the modernization of Japan in the 19th century. The colonial cultivators, coming from various parts of Japan, needed a common language to communicate with each other. They adopted standardized forms, or actually adopted a 'koine' type language system. Thus, in order to observe the typical pattern of standardization in mainland Japan, Okinawa and Hokkaido will be excluded from the analysis.

The overall pattern, excluding Okinawa and Hokkaido, show that railway distances surely correspond to standardization of dialects. This relation may be shown by one direct approximation line added in the Figure. However, at least two main railway routes are discernible in Figure 3. One is a gently-sloping line extending to the bottom center, the railway

line to the west of Japan. The other is the two steep lines going down to the bottom right-hand side, the railways to the north and east of Japan. The great dialectal difference between north-eastern Japan and standardized Tokyo is a well-known fact. This commonsense knowledge is clearly ascertained by this technique. This suggests that drawing several approximation lines for several directions from Tokyo will more clearly explain the differences in rate of standardization of various parts of Japan.

After applying several calculations, and also after analyzing railway distances from Kyoto, areas of Japan were divided into three areas. They are the eastern area from Tokyo, the central area between Tokyo and Kyoto, and the western area from Kyoto. The approximation lines were calculated separately for these three areas. Because of limit of space, I will not explain the graphs and procedures, and only the end results will be entered in the following Figures.

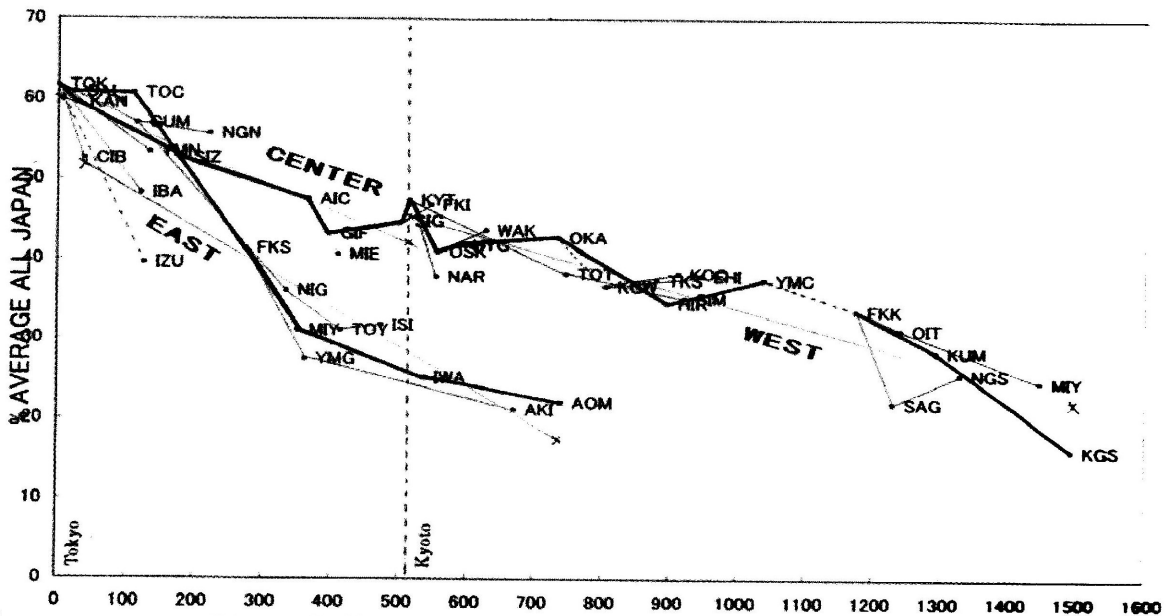


Fig. 4 Railway Distance from Tokyo and standardization

Figure 4 shows the data of Figure 3 after the deletion of Okinawa and Hokkaido. The railway routes are shown more clearly and it looks more compact. The three approximation lines, calculated separately for the three areas above, are entered in Figure 4. The approximation lines for the central area and the western area are almost continuous, the connection point being near Kyoto. The line for the eastern areas is separate. Its starting point is lower and the angle is steeper.

The map above was redrawn in Figure 5 in order to show actual geographical locations of the prefectures. The central and western prefectures were moved to the left-hand side of the figure (and ordered in the opposite direction) so that the order coincides with the actual geographical locations from west to east. This figure looks like the direction of the Japanese islands if they were observed from a space-craft flying over the southern sky of Japan. This figure seems to show that Tokyo is the peak of Japan, with the western line being a gentle slope, while the eastern line is steep. More careful observation shows, however, that another route of central Japan in the northwestern area along the Japan Sea Coast shows another steep line

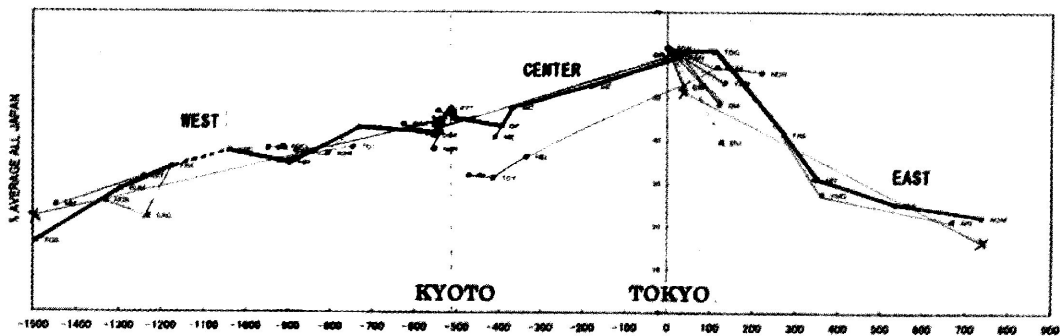


Fig. 5 East and West Railway Distance from Tokyo and standardization

similar to the steep line in the east. This relation will be considered later. This graph suggests that the eastern area of Japan should be treated rather differently from other parts of Japan. However, this idea of special treatment of eastern Japan will be negated later in this paper, after looking at the railway distances from Kyoto in the next section.

3. Railway distances from Kyoto

The railway distances from Kyoto were also calculated. The corresponding figures to Tokyo will be surveyed in this section, and quite a different conclusion will be reached to explain the distribution pattern of the whole of Japan. The railway distances from Kyoto to all the prefectures of Japan are not shown here. Okinawa and Hokkaido are again deleted from the analysis.

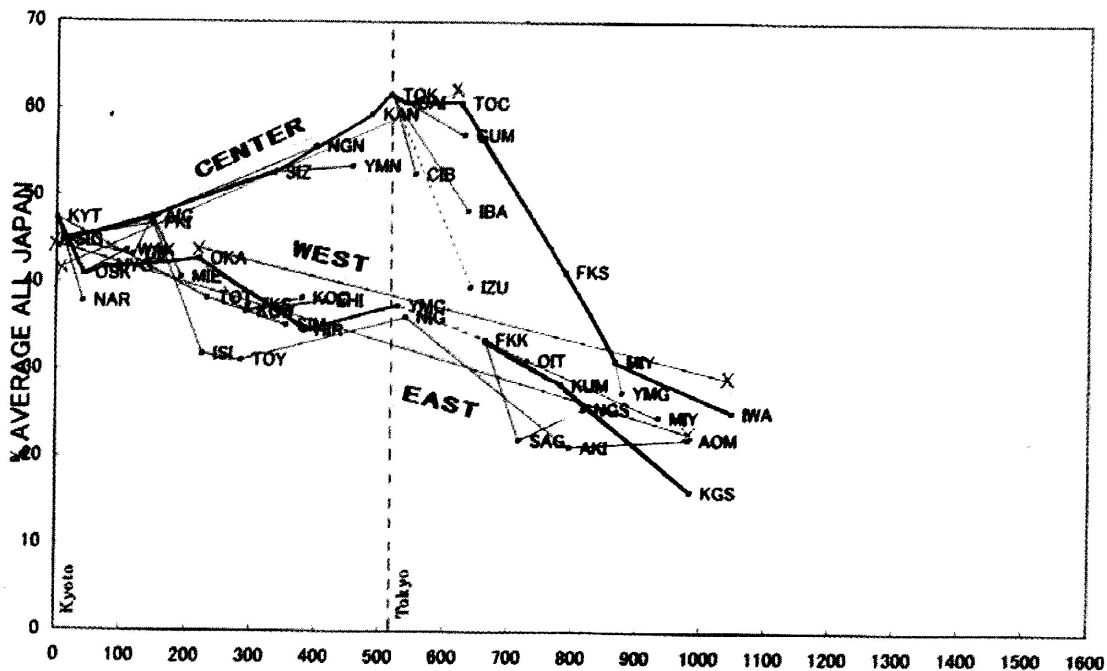


Fig. 6 Railway Distance from Kyoto and standardization

Figure 6 shows the data excluding Okinawa and Hokkaido. The overall pattern is quite different from the Tokyo-centered graph of Figure 4, with the peak lying further right from Kyoto. The peak lies about 500 km from Kyoto, that is, around Tokyo. Railway routes,

however, show that the western prefectures do not follow this mountain-like line. This shows that the old capital Kyoto has lost power for standardization in eastern Japan. For this type of distribution of railway distance and rate of standard forms, a simple approximation line is not appropriate to summarize the relation of the two factors. The three approximation lines were thus calculated separately for the three areas shown above, and were entered in the graph of Figure 6. The approximation line for the central area between Kyoto and Tokyo is exceptional in that it increases as the prefectures become farther. The lines for the western area and eastern area look very close this time. This graph suggests that the central area of Japan should be treated differently from the other areas of Japan.

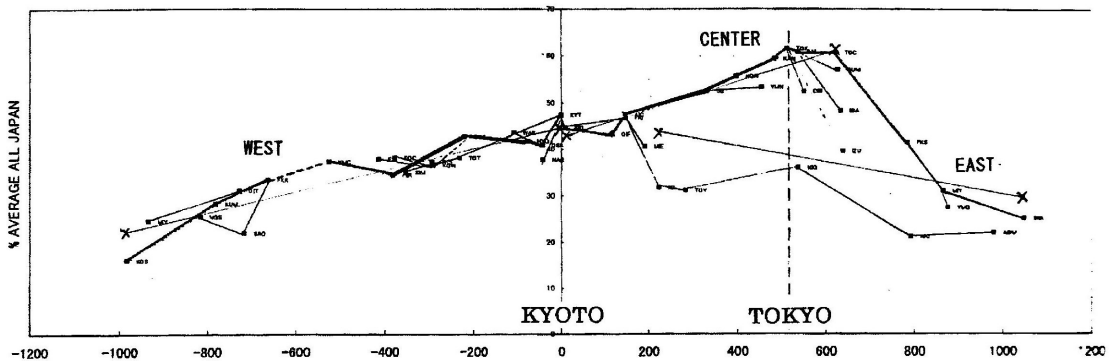


Fig. 7 East and West Railway Distance from Kyoto and standardization

Figure 6 was redrawn in Figure 7 in order to show actual geographical locations of the prefectures. The western prefectures were moved to the left-hand side of the figure according to their order from west to east. This figure again seems to show that Tokyo is the peak of the whole of Japan, with the western line being a gentle slope and the eastern line steep. But more careful observation following the railway routes suggests that railway routes going east along the Japan Sea Coast areas show a gently-sloping line similar to the railway line in the west. Two lines extending from Kyoto show nearly perfect contrast to the west and to the east. Another railway route connecting Kyoto and Tokyo on the busy Pacific Ocean Coast seems to constitute a kind of an independent mountain of standardization with the peak in Tokyo. The graph can metaphorically be interpreted as two mountains seen from a distant southern sky. One mountain is lower but large and gently-sloping, covering the whole of Japan, with its peak situated near Kyoto. The other mountain is higher and steep, situated near Tokyo. It covers only the areas of eastern Japan. The pattern of railway routes near Tokyo in Figure 7 looks just like Mt. Fuji, which is a volcano erupting anew.

This interpretation introduces another idea. The standardization of language in Japan proceeded in two historical stages. The first stage was standardization from Kyoto. It proceeded rather slowly, constituting a gently-sloping mountain from the peak in Kyoto to the two peripheral areas of Japan of the east and of the west. The second stage of standardization appeared later from Tokyo. This standardization seems to have progressed more quickly than the first one, constructing a steep mountain to the eastern half of Japan. (These two stages were ascertained later by classifying 82 words into 3-5 clusters. West cluster words showed Kyoto-centered diffusion and east cluster words showed Tokyo-centered diffusion.)

4. Three stages of Japanese standardization

We have thus observed the general pattern of standardization of language in Japan from the standpoint of geographical distance from the two cultural centers. From now on theoretical problems will be discussed.

The prefectures which are heavily influenced by Tokyo, constituting the volcano in Figure 7, were encircled in Figure 1 above. They are the prefectures that are metaphorically covered by Mt. Fuji. They coincide with the prefectures of more than 50 % of standardization. They are also the prefectures surrounding Tokyo, and its western end is the famous dividing line between eastern and western dialects of Japan.

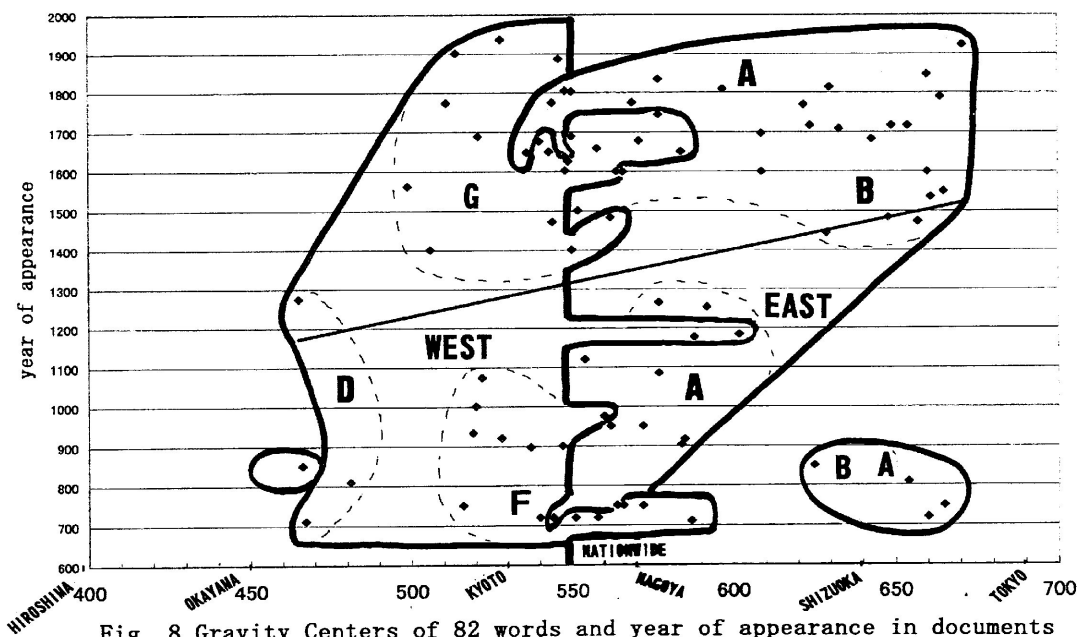


Fig. 8 Gravity Centers of 82 words and year of appearance in documents

This new interpretation of Japanese standardization in two stages on the basis of prefecture average value can be supported by the other dimension of the Kasai data, the dimension of words. Figure 8 shows the gravity centers or the geographical centers of the distribution for each word. The horizontal dimension is the same as the figures shown so far. Only the central portion of Japan is shown in this figure because almost all the gravity centers lie between Kyoto and Tokyo. This time the vertical dimension shows the year of first appearance in historical documents of each word. The bottom corresponds to 8th century when the Japanese language was first widely recorded. The top corresponds to 20th century. As the graph shows, words which appeared earlier extend to a wider area, but mainly in the western half of Japan, while words which appeared in later centuries are mainly situated in eastern Japan, near Tokyo. The approximation line in the center of this figure is rising in the direction of the right or east. The historical movement of the cultural center from west to east is thus reflected in the movement of gravity centers of the standard words. (Letters of A to G show the result of clusters analysis for 82 words.)

Figure 8 also suggests that there are two extreme types of standard forms. One type includes the standard forms, which have been in use since the beginning of the Japanese language. Other dialectal expressions appeared later in various areas in Japan. Many of the

forms, which appeared in early history, belong to this type. The other type includes the standard forms which appeared later in history and were adopted as standard because they were used in the cultural center or adopted as written forms. Many of the recent standard forms belong to this type, like the words plotted on the top-right section of Figure 8.

The direct reflection of these words is the average usage of standard forms for each prefecture. Thus, the geographical pattern in Figure 8 can be interpreted historically, too. Standardization in Japan must have been influenced by the cultural and political power of Kyoto in the past. Later in the last two or three centuries, the cultural power of Tokyo has become more influential, and has begun to influence language. However, this power was not so strong and only prefectures near Tokyo in the eastern part of Japan were influenced. The routes of influences at that time were mainly modern railroads and the main roads connecting large cities.

An analysis of younger Japanese people through a countrywide postal survey showed that standardization has proceeded with greater speed in recent years. Most of the words of the Kasai data approached the end of diffusion. Therefore, it has become rather difficult to find geographical differences among the prefectures, though in some words large-scale differences between western and eastern Japan are still clear. This third stage of standardization seems to have been influenced by the mass-media. This can be expressed metaphorically as a great eruption of a new volcano, covering the whole Japan with thick volcanic ash – something that we do not want to actually occur.

5. Conclusion

In this presentation, the nationwide percentage of standardization was analyzed. A technique measuring railway distances was applied, and comparison with the rate of standardization was attempted. This technique was inspired after finding that standardization of Japanese is controlled by two factors of east and west, as a result of various multivariate analyses. After applying multivariate techniques, the results could be represented by more concise and simplified numerical techniques. As this simple technique has proved interesting for Japanese, I would like to apply the same technique to dialects of other languages. English in Great Britain is the first candidate because computerized data is available for researchers thanks to Prof. Dr. Viereck. Prof. Dr. Goebel has also made use of dialectal distribution data in Italy, Switzerland, France and some other countries. Although the dialectal data is from within one country, the methodology and technique of analysis is international. The occasion of this International Congress is the most appropriate place to exchange ideas of analysis.