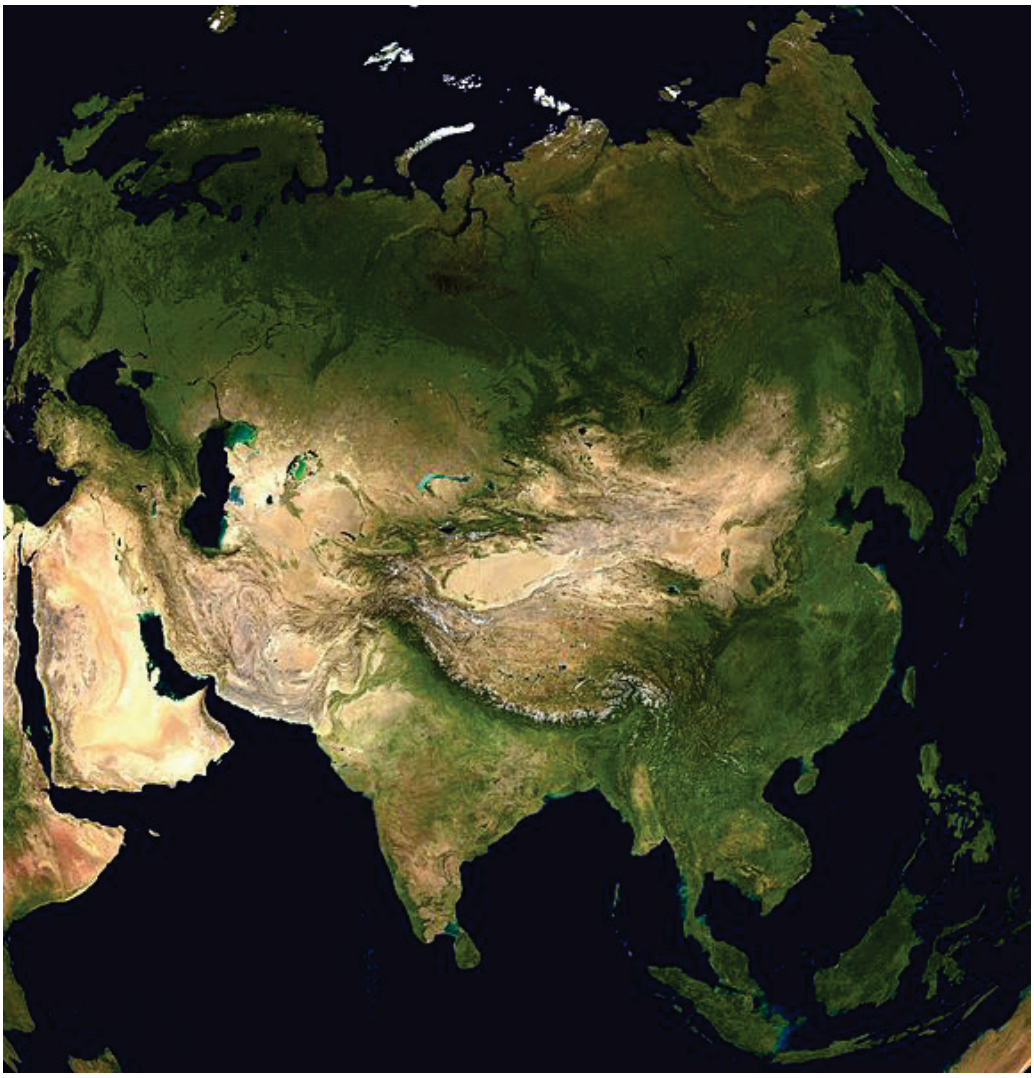
Papers from the First International Conference on Asian Geolinguistics



December 14th-15th, 2012

Aoyama Gakuin University, Tokyo, Japan

Program of the First International Conference on Asian Geolinguistics

Date: December, 14 – 15, 2012

Venue: The 10th Meeting Room, Soken Building 3F, Aoyama Gakuin University, Shibuya, Tokyo, Japan

First Day: December 14th Friday

Session 4 Chair: **John Whitman** (National Institute for Japanese Language and Linguistics)

16:30-17:00 A Study on the Phonetic Variation in Japanese Dialects Using the '*Acoustic Linguistic Atlas of West Japan*'

Nobuko Kibe (National Institute for Japanese Language and Linguistics) ····· 107

17:00-17:30 Studies on Korean Dialects in China and North Korea

Jinhua Li (Nanjing University) ····· 116

17:30-18:00 The Words for "Rain" in the Mongolic Languages: Their Geographical Distribution and History

Yoshio Saito (Tokyo Gakugei University) ····· 126

18:20-20:00 **Welcome party** at Aogaku Kaikan

Second Day: December 15th Saturday

Session 5 Chair: **Hsiao-feng Cheng** (National Central University)

10:00-10:30 On the Formation of Geographically Complementary Distribution

Ray Iwata (Kanazawa University) ····· 133

10:30-10:50 The Introduction of *Linguistic Atlas of Chinese Dialects*

Zhiyun Cao and **Xiaohai Liu** (Beijing Language and Culture University) ····· 141

in absentia, read by **Ray Iwata** (Kanazawa University)

10:50-11:20 A Gradual Path to the Loss of Entering Tone Syllables: Case Studies of Jin Dialects in the Lingshi Highlands, Shanxi

Li Shen and **Naomi Nakano** (Doshisha University) ····· 152

11:20-11:50 The Distributions and Changing Process of Tone Value in Shanxi Area

Kenji Yagi (Kyoto University) ····· 171

Lunch

Session 6 Chair: **Ray Iwata** (Kanazawa University)

13:00-13:30 The Linguistic Distribution and Regionalization of Taiwan

Uijin Ang (Taichung University of Education) ····· 181

13:30-14:00 The Linguistic Geography of Inland Dialects of Fujian

Hsiao-feng Cheng (National Central University) ····· 196

14:00-14:30 History of the Words for 'Water chestnut' in the Chinese Dialect

Takashi Ueya (Chiba University) ····· 217

break

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Acknowledgments

This work was supported by a JSPS KAKENHI Grant Number 236520878, 2011-12, Grant-in-Aid for Challenging Exploratory Research, representative: Mitsuaki Endo, “Reconstructing the micro and macro history of languages using linguistic maps across countries and language families in Eastern Eurasia”. The cover photo is taken from http://ja.wikipedia.org/wiki/%E3%82%A2%E3%82%B8%E3%82%A2, accessed on December 1, 2012.

Tasks of Asian Geolinguistics

Mitsuaki Endo
(Aoyama Gakuin University)

1. The goal

Our purpose is to construct an Asian Highway (AH) in the field of linguistics. The AH project was initiated by the United Nations in 1959. The AH-1 starts from Tokyo and goes to the border between Asia and Europe near Istanbul, and the other highways crisscross all of Asia. Our ultimate goal is, first, to compile *The Linguistic Atlas of Asia*, which will show thousands of places where hundreds of words and linguistic features are found, and second, by compiling this atlas, to promote geolinguistic studies on Asian languages.

Similar projects are already in progress for European or other world languages: *Atlas Linguarum Asiae* has been in the process of compilation since 1965. It is supported by UNESCO, and six parts of volume I are already published (see http://ale.lingv.ro/). Additionally, the results of the project Pan-Slavic Linguistic Atlas have been successively published starting from 1974, that is, Академия наук СССР, Институт русского языка (1974) *Общеславянский лингвистический атлас, материалы и исследования 1971,*《наука》, and many succeeding volumes.[1] Further, the results of research on geolinguistic typology are shown in M. Haspelmath et al. eds. (2005) *The World Atlas of Language Structures*, Oxford University Press, and its website http://wals.info/.

Compared with Europe, Asia is far bigger and has a more complex language situation. Moreover, few geolinguistic studies exist on the majority of language families in Asia. In this article, we present a survey of the previous geolinguistic studies on Asian languages. We also describe the tasks necessary to compile *The Linguistic Atlas of Asia* as well as concrete plans to attain this goal.

2. Survey of previous geolinguistic studies on Asian languages

2.1. Relevant works from around the world

Aspects of the geographical distribution of Asian languages are included in the following comprehensive works.

P. W. Schmidt, S.V.D. (1926) *Die Sprachfamilien und Sprachenkreise der Erde*, Atlas von 14 Karten, Carl Winter's Universitätsbuchnadlung (reprint: Helmut Buske Verlag, 1977). Schmidt drew precise world maps of language distribution, ethnologic culture area, initial and ending sounds,

[1] In this article, reference literature is given in the text, not in a bibliography at the end.

dual and trial of inclusive/exclusive, word classification, number system, and genitive.

Hideo Suzuki (1982, 1983) "World Distribution of Basic Words," In: *Bulletin of the Department of Geography, University of Tokyo*, 14, 15 and Hideo Suzuki (1988), *Climate Alteration Changed Language* [in Japanese], NHK books 607, Nihon Hoso Shuppan Kyokai. He drew maps of basic vocabulary in world languages and examined the relationship between geographical distribution and historical change from the standpoint of historical climatology, which is his research specialty.

Hideki Yamamoto (2003) *Survey and Historical Study of Geographical and Genealogical Distribution of Word Order around the World* [in Japanese], Keisuisha. Yamamoto treated basic word order.

Martin Haspelmath et al. (2005) *The World Atlas of Language Structures*, Oxford University Press. Haspelmath et al.'s atlas is a typological work.

Katsumi Matsumoto (2007) *Japanese in World Languages* [in Japanese], Sanseido as well as his (2006) *Perspectives Towards World Languages, Historical Linguistics and Linguistic Typology* [in Japanese], Sanseido. Both works address geolinguistic typology using linguistic maps of the world.

Also on the topic of geolinguistic typology is Roman Jakobson (1931) "К характеритике евразийского языкового союза," In: *Selected Writings* I, Mouton, 1962 [Japanese translation: *Kozoteki Oninron*, Iwanami Shoten, 1996]. This work surveys phonological "language union" (языковой союз or Sprachbund) in Eurasia, although Jakobson did not draw maps. In Europe, there are several similar studies, such as Gyula Decsy (1973) *Die linguistische Struktur Europas*. Otto Harrassowitz, and works produced by the Eurotyp project.

Although language distribution maps are a convenient means by which to grasp the location of each language family, language or dialect, they do not have a main status in proper linguistic geography. The following are representative works: Richard Salzner (1960) *Sprachenatlas des Indopazifischen Raumes*, Otto Harrassowitz; Christopher Moseley and R.E. Asher (1994[1], 2007[2]) *Atlas of the World's Languages*, Routledge; Stephen A. Wurm et al., eds., (1996) *Atlas of Languages of Intercultural Communication in the Pacific, Asia, and the America*, Mouton de Gruyter; M. Paul Lewis, ed. (2009) *Ethnologue*, 16th edition, SIL International.

2.2. Former geolinguistic studies dealing with wide areas of Asia

Asie du sud-est et monde insulindien (EPHE, CNRS), 2/4 (1971), 3/4 (1972), and other issues published geolinguistic works on Southeast Asian languages, that is, Tai, Karen, Miao-Yao, Austronesian, Tibeto-Burman, and Chinese. The issues include maps of the words "salt," "dog," and "tooth" in these languages.

Nicole Revel's (1988) *Le riz en Asie du sud-est*, Editions de l'Ecole des Hautes Etudes en

Sciences Sociales, is a continuation of the above-mentioned project, mapping the vocabulary of rice cultivation in this area.

Colin P. Masica's (1976) *Defining a Linguistic Area: South Asia*, published by The University of Chicago Press, is an ambitious endeavor dealing with word order typology in Asia as whole.

Mantaro J. Hashimoto's (1978) *Linguistic Typo-geography* [in Japanese], published by Kobundo, claims that Altaic languages, Chinese, and Tai-Kadai constitute a linguistic continuum in terms of syntax, basic vocabulary, and phonology.

2.3. Geolinguistic studies of each area of Asia

2.3.1. Japan

According to Takuichiro Onishi's (2007) "Mapping Japanese Dialects [in Japanese], " published in *Geolinguistics Around the World*, Proceedings of the 14th NIJL International Symposium, the first linguistic maps were published in 1905 and 1906. They are among the earliest linguistic atlases in the world, just after Wenker et al.'s (1888) *Sprachatlas des Deutschen Reiches* and Gilliéron et al.'s (1902–1910) *Atlas Linguistique de la France*. Since then, in over 100 years of further study, over 400 volumes of dialect atlases have been published. Two representative linguistic atlases are *Linguistic Atlas of Japan*, 6 vols., 1966–1974, which comprises 300 maps of word items in 2400 places, and *Grammar Atlas of Japanese Dialect*, 6 vols., 1989–2006, which comprises 350 maps of grammatical items in 807 places. A concise overview of geolinguistic studies on Japanese dialects is given in Yoshio Mase (2002) "Studies of Dialect Geography in Japan During the 20th Century" [in Japanese], In: Yoshio Mase et al. *Tasks of Dialect Geography*, Meiji Shoin.

For the Ainu language, see Hiroshi Nakagawa's (1996) "A Historical Study on the Ainu Language with Linguistic Geography [in Japanese]," published in the *Bulletin of the Hokkaido Ainu Culture Research Center*, 2; also in *Ainugo ko* [in Japanese], 1, Tokyo, Yumani Shobo, 2001.

2.3.2. Korea

There were already profound studies on Korean dialects using the geolinguistic method in the first half of the 20th century: Shimpei Ogura (1924) *Dialects of South Korea* [in Japanese], Keijo: Chosen shi gakkai, also in: *Collected Works of Dr. Shimpei Ogura*, vol. 3, Kyoto University, 1975; Shimpei Ogura (1940) *The Outline of the Korean Dialects*, The Toyo Bunko, also in *Collected Works of Dr. Shimpei Ogura*, vol. 3, Kyoto University, 1975; Shimpei Ogura (1944) *Studies in Korean Dialects* [in Japanese], 2 vols., Iwanami Shoten; Rokuro Kono (1945) *An Essay on Korean Dialectology* [in Japanese], Keijo: Toto Shoseki; also in: *Collected Works of Rokuro Kono*, 1, Heibonsha, 1979.

Concerning postwar studies in South Korea, see Bae Juchae (2002) Dialect Geography in South

Korea [in Japanese], In: Yoshio Mase et al., *Tasks of Dialect Geography*, Meiji Shoin.

Seiichi Nakai (2007) *Linguistic Maps of Korean Peninsula* [in Japanese], Report of Grant-in-Aid for Scientific Research, JSPS. These maps cover North Korea as well, because their sources came from Shimpei Ogura (1944).

The recent large work in this area is Ik-seop Lee et al.'s (2008) *The Linguistic Atlas of Korea* [in Korean], Seoul: Thaehaksa.

2.3.3. China

Fr. Grootaers started Chinese dialect geography in the real sense in the 1940s. Indeed, Chinese scholars drew dialect maps; for example, Yuen Ren Chao et al.'s (1948) *Report on a Survey of the Dialects of Hupeh* [in Chinese], published in Shanghai by Academia Sinica, includes 64 maps of each linguistic feature and a synthetic map of isoglosses of these features. The authors' main interest was taxonomy.

Ray Iwata collected the papers on Chinese dialect geography by Fr. Grootaers in 1977 (a copy is preserved in the Department of Chinese, University of Tokyo), and he executed a geolinguistic investigation in Jiangsu province, China in 1980. From 1989 onwards, he headed the Project on Han Dialects under the support of the grant-in-aid for Scientific Research from the Ministry of Education, Japan and JSPS. Six volumes of Chinese dialect maps (draft version in Japanese) were published in 1992, 1995, 1999, 2004, 2006, and 2007 (last volume is in Chinese), and the formal version is the following: Ray Iwata, ed., *The Interpretative Maps of Chinese Dialects* (in Chinese and English), vol.1, 2009, Tokyo: Hakuteisha, vol. 2, 2012, Tokyo: Kobun Shuppan.

Zhiyun Cao conducted a project on Chinese geolinguistics from 2001, and the results were published in the *Linguistic Atlas of Chinese Dialects*, 3 vols., Beijing: The Commercial Press, 2008.

The International Conference on Chinese Geolinguistics was held for the first time in 2010, and a second meeting was held in 2012. The conference will be held in China every two years.

Concerning the geolinguistic studies on Chinese, see the following works: Natsuka Miki (2008) "Bibliography on Chinese Dialect Geography" [in Japanese], In: *Cultural Science Reports of Kagoshima University*, 68, 39–58, http://hdl.handle.net/10232/6280; Anonymous (2010) "Bibliography of Geolinguistic Studies" (draft) [in Chinese], In: *Proceedings of the First International Conference on Chinese Geolinguistics & the Protection and Utilization of Traditional Dialects in China and Japan* , 273–281.

Regarding minority languages in China, there are some pioneer works on Dong, Sui, and Buyi published in the late 1950s. The last one was included in *Report on the Buyi Language Investigation* [in Chinese], Beijing, Sciences Publishing House, 1959. See also F. Dell (1969) "*Langue en contact et changements phonétique: notes sur l'histoire des finales en Bu-yi (Dioi)*," In: *BSLP*, 64/1.

Youjing Jin's (1992) *Dialect Atlas of Lahu in China* [in Chinese], 2 vols., published by Tianjin Social Sciences Publishing House is a systematic investigation of Lahu dialects in China.

2.3.4. Taiwan

Uijin Ang's (2002) "Dialect Geography on Chinese in Taiwan [in Japanese]" in Yoshio Mase et al.'s *Tasks of Dialect Geography*, published by Meiji Shoin (also available online on Professor Uijin Ang's website), overviews the state-of-the-art in Taiwan. It describes the dialect investigation performed at Academia Sinica from 1988 to 1996 and says that the material from this investigation has enabled researchers to draw over 1000 minute Taiwan dialect maps. Recent works include the following: Warren A. Brewer (2008) *Mapping Taiwanese*, Institute of Linguistics, Academia Sinica; Mitsuaki Endo (2011) "Linguistic Maps of Formosan Languages in the Early Twentieth Century: 'Hand' and 'Five'" [in Chinese], In: *Journal of Taiwanese Languages and Literature*, 6/2, 1–14. The last work is an attempt to draw dialect maps of Taiwan's aboriginal Austronesian languages.

2.3.5. Mongolia

Académie des Sciences de RPM (1979) *Atlas éthnologique et linguistique de la République Populaire de Mongolie*, Ulan Bator. The raw materials of this dialect investigation are at the Institute of Language and Literature, Mongolian Academy of Sciences. See the following catalogues: Alimaa Ayushjav and Katuu Balchig (2004) *Registration of Written Materials Kept by Collection of Mongolian Folklore and Local Dialects*, vol. 1; *Registration of Magnetic Tape Records Kept by Collection of Mongolian Folklore and Local Dialects*, vol. 2. Institute of Language and Literature, Mongolian Academy of Sciences.

See also Takahiro Fukumori (2007) "Phonetic transcription of vowels in *Atlas éthnologique et linguistique de la République Populaire de Mongolie*" [in Japanese], In: *Gogaku Kyoiku Forum*, 13, 185–195.

2.3.6. Thailand

There are several Ph.D. and M.A. theses on Thai dialect geography at Chulalongkorn and Mahidol Universities. Professor Kalaya Tingsabadh and Dr. Sirivilai Teerarojanarat investigated correspondences in 4000–5000 places around Thailand for 70 lexical items.

Another work on Thai dialect geography is the following: Somsonge Burusphat (2000) *Dialect Geography* [in Siamese], Institute of Language and Culture for Rural Development, Mahidol University.

2.3.7. Laos

Reiko Suzuki (2012) "The Distribution of /ay/ in standard Lao" [in Japanese], In: *Reports of the*

Keio Institute of Cultural and Linguistic Studies, 43, 263–277.

2.3.8. The Philippines

C. Mcfarland (1977) *Northern Philippine Linguistic Geography*, ILCAA; C. Mcfarland (1980) *A Linguistic Atlas of the Philippines*, ILCAA; C. Mcfarland (1983) *A Linguistic Atlas of the Philippines*, De la Salle University and the Linguistic Society of the Philippines.

2.3.9. Indonesia

B. Nothofer (1980) *Dialektgeographische Untersuchungen in West-Java und im westlichen Zentral-Java*, Otto Harrassowitz; B. Nothofer (1981) *Dialektatlas von Zentral-Java*, Otto Harrassowitz. According to http://www.eva.mpg.de/lingua/research/javanese.php, The Javanese Dialect Mapping Project is currently underway.

2.3.10. Cambodia

Makoto Minegishi (1985) "Modern Khmer Orthography and its Dialect" [in Japanese], In: *Gengo Kenkyu*, 88, 41–67. Filippi Jean-Michel of the Institute for the Development of Social Sciences in Cambodia is planning a geolinguistic investigation of the Khmer dialects.

2.3.11. Nepal

D.D. Sharma (1994) *Linguistic Geography of Kumaun Himalayas*, New Delhi: Mittal Publications.

2.3.12. India

H.S. Gill (1973) *Linguistic Atlas of the Punjab*, Patiala: Department of Anthropological Linguistics, Punjabi University. The followings are language distribution maps: K.S. Singh (1993) *An Anthropological Atlas: Ecology and Cultural Traits, Languages and Linguistic Traits, Demographic and Biological Traits* (People of India v. 11), Delhi: Oxford University Press; R.P. Singh and J. K. Banthia (2004) *Language Atlas of India 1991*, Delhi : Controller of Publications; Toshiki Osada and Masayuki Onishi eds. (2012) *Language Atlas of South Asia*, Department of South Asian Studies, Harvard University.

2.3.13. Iran

Gérard Fussman (1972) *Atlas linguistique des parlers Dardes et Kafirs*, Ecole Française d'Extrême-Orient. According to http://www.eva.mpg.de/lingua/research/araxes.php, *Atlas of the Araxes-Iran Linguistic Area*, which covers the languages in south Caucasus, eastern Turkey, northern Iraq, and northern Iran, will be published in 2014.

2.3.14. Turkey

T. Hayasi (1987) "A Preliminary Report on Bolu Dialect of Turkish," In: *Annals of Japan Association for Middle East Studies*, 2, 239–260; T. Hayasi (1988) *A Turkish Dialect in North-Western Anatolia: Bolu Dialect Materials*, Tokyo: ILCAA; T. Hayasi (1991) "Geographical Distribution of Some Turkish Dialect Forms in Bolu" [in Japanese], In: *Journal of Asian and African Studies,* 42, 159–173; T. Hayasi (1995) "The Relevance of Immigrant Areas in Dialect Distribution: The Case of the Bolu Dialect of Modern Turkish" [in Japanese], In: *Journal of Asian and African Studies*, 48/49, 659–673.

2.3.15. Arabic languages

Peter Behnstedt (1985) *Die nordjemenitischen Dialekte*. Teil 1 Atlas. Dr. Ludwig Reichert Verlag; Peter Behnstedt (1992–1996) *Die nordjemenitischen Dialekte*. Teil 2 Glossar. Dr. Ludwig Reichert Verlag; Peter Behnstedt (1997) *Sprachatlas von Syrien* (Kartband + Beiheft), Otto Harrassowitz Verlag; Peter Behnstedt and Manfred Woidich (1985–1994) *Die aegyptisch-arabischen Dialekte*. Band 1–4. Dr. Ludwig Reichert Verlag; Peter Behnstedt and Manfred Woidich (2005) *Arabische Dialektgeographie, Eine Einfürung*, Brill.

2.3.16. Polynesia

J.-M. Charpentier et Alexandre François (forthcoming) *Atlas linguistique de la Polinésie française*, Berlin: Mouton de Gruyter.

2.3.17. Vanuatu

Jean-Michel Charpentier (1982) *Atlas Linguistique du Sud-Malakula*, vols. 1–2, Paris: LACITO, SELAF.

2.3.18. Papua New Guinea

Hirofumi Teramura and Kazuya Inagaki (2011) "Geographical analysis of dialect distribution using GIS – dialect maps of Sibe (Nagovisi) language in Southern Bougainville [in Japanese]," In: Masayuki Onishi and Kazuya Inagaki, eds. *Papers in Descriptive Linguistics of the Research Institute for Humanity and Nature*, 3, 183–208.

2.3.19. African languages

L.B. de Boeck, C.I.C.M. (1953) *Contribution à l'Atlas linguistique du Congo belge*, Bruxelles, Institut Royal Colonial Belge. Bernd Heine and Derek Nurse (2008) *A Linguistic Geography of Africa*, Cambridge University Press. Osamu Hieda et al. (2011) *Geographical Typology and Linguistic Areas*, John Benjamins.

3. Tasks of Asian geolinguistics

This chapter addresses concrete tasks of Asian geolinguistics.

First, we define "geolinguistics" in a broad sense, including the following: 1) traditional dialect geography or linguistic geography inside a language or language family; 2) geographical studies comprising a sociolinguistic view, for example, the viewpoints of age, gender, and social class differences; and 3) typological treatment of the geographical distribution of language.

Asia is such a large geographic area that it cannot be studied all at once; instead, it should be divided into small parts for ease of analysis. The first step is to draw maps country by country, or for each language. Second, individual language families that span across multiple countries can be handled. Then, a wider range of maps that show multiple language families spanning across several countries can be drawn. Finally, maps of the entire continent can be achieved by linking these area maps. For example, we can draw dialect maps for Zhuang, Buyi, Lao, Thai, and so on, respectively, and then synthesize them into Tai-Kadai maps. After that, other maps for Tibeto-Burman, Austroasiatic, and Hmong-mien can be combined to represent continental Southeast Asia, and finally, they will be combined with maps of other parts of Asia, e.g., Austronesian, East Asia, Northeast Asia, Central Asia, South Asia, West Asia, and Uralic. Alternatively, it might be more convenient to take the language family as the basic unit, because cognate words spread over diverse districts of the language family, and the same word form should be given the same symbol.

For spot density, various degrees can be supposed. There are 2400 spots in the *Linguistic Atlas of Japan*. Asia is 115 times larger than Japan in terms of area (Japan: 380,000 km^2; Asia: 44,000,000 km^2). However, as the population is very low in Siberia and Central Asian deserts, Asia is 30 times larger in terms of population (Japan: 0.13 billion, Asia: 4 billion). Using the Linguistic Atlas of Japan as a guide, we see that 30 × 2,400 is 72,000 spots, and 115 × 2,400 is 276,000 spots: These are astronomical numbers. Teruo Hirayama et al., eds., *Dictionary of Japanese Dialects*, 9 vols., Meiji Shoin, includes 2,300 lexical items for 72 spots: 72 × 30 = 2,160, and 72 × 115 = 8,280, so practical spot density should be around 2,000 to 10,000 for all of Asia. A first approximation can be done with 500 spots.

The main subject of Asian geolinguistics should be words. The traditional term "word geography" represents the essential nature of linguistic geography. Sound, morphology, and syntax should also be treated.

Proper nouns, including place names and surnames, are an interesting topic reflecting humankind's migration history. The following are two examples of research on proper nouns in Chinese: Zhengxiang Chen (1978) *Place Names in China* [in Chinese], Hong Kong branch, the Commercial Press; Yida Yuan and Cheng Zhang (2002) *Surnames of Chinese: Population Genetics and Population Distribution* [in Chinese], Huadong Normal University Press.

New trends such as the use of structural dialectology, glottograms, and time series maps, which

compare more than two states at different times in the same area, are useful of course. Still, in the vast area of Asia, where even word maps are not yet drawn, the first step should be to map hundreds of words and interpret their distribution. Ray Iwata said, "Postmodernism is impossible without achieving modernization."

Yet linguistic maps are not the final goal of geolinguistics. The more essential matter is how to interpret the geographical distribution of each map. *Chaque mot a son histoire* 'Each word has its own history' is a well-known slogan of linguistic geography. According to Takeshi Shibata (1969), in *Methods of Linguistic Geography* [in Japanese] published by Chikuma Shobo, "Linguistic geography is a method of historical linguistics." Both ideas represent that the central task is to reveal the diachronic formation process of the current geographical distribution word by word within the range of internal linguistic factors.

Linguistic geography relates closely to external factors, for example, the relationship between spreading patterns of things and land features, administrative districts, and migration of human groups. Thus, some studies have combined research on genetics and the study of Asian languages, for example, Li Jin et al. (2001) *Genetic, Linguistic and Archaeological Perspectives on Human Diversity in Southeast Asia*, World Scientific and Sagart et al. (2005) *The Peopling of East Asia*, Routledge Curzon.

Asian geolinguistics bears a macro perspective across countries and language families. Hence, borrowing and language contact among different language families is an important issue to take into account. For examples, Chinese borrowings are widespread in East Asian languages, such as Japanese, Korean, Vietnamese, Zhuang, Bai, and so on. Sanskrit and Pali origin words play an important role in the Indian culture area. For example, the word for "horse" has striking similarity among languages in Eastern Asia: *uma* in Japanese, *mar* in Korean, *morin* in Mongolian, *ma* in Chinese, *ma* in Thai, and *mrang* in Burmese (see E.D. Polivanov (1974) "Indo-European **sū*[*s*] – Ancient Chinese **ču* 'pig,'" pp.159–160, In: *E.D. Polivanov Selected Works*, Mouton); the words for "iron," which are *tetsu* in Japanese and *cheol* in Korean, are evidently borrowed from Middle Chinese (*tiě* in Modern Mandarin), while *hlek* in Thai and *Qhleks in proto Sino-Tibetan are likely related to the Old Chinese form (Chang Kun (1972) "Sino-Tibetan 'iron': *qhleks," In: *Journal of the American Oriental Society*, 92(3), 436–446). In the study of language contact, convergence phenomena can be traced in greater detail using linguistic maps.

The directions of linguistic changes at various levels, phonetic, morphological, syntactic, and semantic, can be extracted from the results of geolinguistic studies on Asian languages. It should be possible to compile a collection of real examples from Asian languages, similar to the following: Heine and Kuteva (2002) *World Lexicon of Grammaticalization*, Cambridge University Press; Martin Joachim Kümmel (2007) *Konsonantenwandel: Bausteine zu einer Typologie des Lautwandels und ihre Konsequenzen für die vergleichende Rekonstruktion,* Wiesbaden: Reichert (rev. by Masato

Kobayashi (2010) *Kratylos* 55, 45–54).

Further, collaboration with philology and comparative linguistics is desirable to the greatest extent possible, as it is dangerous to classify various word forms without knowledge of sound correspondences when drawing linguistic maps. Historical studies using ancient documents, epigraphy, or orthography that reflects old forms of the language are useful in interpreting geographical distribution.

4. Concrete plans

Several types of activities will be carried out in order to realize the compilation of *The Linguistic Atlas of Asia*.

First is the International Conference on Asian Geolinguistics. A preparative gathering for domestic members was held on December 22–23, 2007 at Aoyama Gakuin University. Following this gathering, our endeavors to secure grants failed twice, and we finally received a modest budget from JSPS under the subject "Reconstructing the micro and macro history of languages using linguistic maps across countries and language families in Eastern Eurasia" as Challenging Exploratory Research for the academic year 2011-12. Here, "micro" has two meanings: One is that the history is reconstructed at the level of dialects, not standard languages; the other is that the unit of analysis is a word or linguistic feature, not language as whole. The meaning of "macro" is clear, as the range is the vast area in the eastern part of Asia, not a country or smaller area. Although presentations at the first conference are restricted to Eastern Asian languages, languages from anywhere in Asia should be treated from next time onward.

Thanks to the courtesy of Professor Kalaya Tingsabadh, the second conference will be held at Chulalongkorn University, Bangkok, Thailand in 2014. The intention is to hold the conference once every two years in different countries in Asia, Europe, North America, Oceania, or other areas of the world. This sphere is created to promote geolinguistic studies in Asia in general.

Second, the Asian Geolinguistic Circle of Japan will be formed as of June 14, 2013. This is a domestic group in Japan that will hold annual meetings on the day before the spring conference of the Linguistic Society of Japan.

Third, we will apply for a collaborative research project with a research institute next year. If the project is adopted, it will be called the "Project on the Linguistic Atlas of Asia (PLAA)." This project will bring together 20 researchers on Asian languages, including overseas researchers, for a three-year collaboration. The aim is to execute a concrete plan to compile the first 10 maps of Asian languages. The features expected to be drawn on these maps are "the sun, five, hand, mother, iron, paddy rice, salt, word order of numerals (including the problem of classifiers), and manner of articulation of consonants."

Moreover, lecture presentations and seminars for the younger generation can be held ad hoc in

appropriate occasions in Asian countries.

Finally, there is an urgent need for the standardization of data and mapping architecture. After careful consideration, we conclude that the most appropriate software for drawing linguistic maps is Arc GIS. It is the most dominant software in all specialties in the world. It is easy to manipulate, such that even freshmen can use it without much training. The sole drawback is its high price, but many universities have a license that will allow all students and faculty members to use it freely. IPA transcription should be highly restricted within the Unicord, and no additional fonts should be allowed in common data. Latitude and longitude should be unified to WGS1984 datum, which is easily obtained from Google Maps. Ideally speaking, such standardized data will be spread to the public as open source. A model is available on the website of the National Institute for Japanese Language and Linguistics, where picture images of the *Linguistic Atlas of Japan* and *Grammar Atlas of Japanese Dialects* (GAJ) are available as .pdf files (http://www.ninjal.ac.jp/publication/catalogue/laj_map/); even raw GAJ data can be downloaded freely (http://www2.ninjal.ac.jp/hogen/dp/dp_index.html).

Mapping Spatial Ongoing Change of Thai Dialects in the Upper Central Region of Thailand: a Case of Phonological Study

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Abstract

This paper integrated the spatial-based technique using Geographic Information System (GIS) to investigate the dialect ongoing change both in terms of the spatial pattern and its rate of change. The transition area of Central Thai, Northern Thai, and Northeastern Thai located in the upper central part of Thailand was chosen as the study location. Phonological variation in two age groups based on the CH-C-S correspondence set was investigated. Resultant maps are promising. The main finding is that the ongoing change from Northeastern Thai to Central Thai was found mostly in Loei and some parts of Phetchabun province, with the rate or speed of change between 41-60%. The role of GIS is obvious, assisting linguistics to interpret and better understand the characteristics of ongoing change, especially in the spatial dimension.

Keywords: Ongoing change, phonological variation, Age group, GIS, Thailand

Introduction

Several studies in Thai dialectology have been conducted for more than four decades to contribute basic understanding and new knowledge on dialect variation. The analysis of dialect change is also getting more attention. Social variables such as sex, gender, age group, education, or social class have been investigated to analyze the patterns of changes. Among all of these social variables, age group was widely applied to study the dialect ongoing change[1] in Thai research works (i.e. Punthong, 1979; Maryprasith, 1991; Manoosawet, 1993; Chaisakulsurin, 1994; Patpong, 1997; Tantinimitrkul, 2001; Jaisai, 2003). Their results showed that the variation of age could be, to some degree, used as an indicator for predicting the future direction of dialect change. Most of these previous works, however, studied the ongoing change on the basis of lexical study. Only a few investigated the change from the phonological aspect (Rinprom 1987, Chutiwat 1991). Moreover, none of them applied

[1] When two generations of speakers use language differently linguists say that there is variation by age. Such variation shows that ongoing change is taking place. Change eventually takes place when all of the speakers in a community no longer use a language or some features that once occurred in a language.

Geographic Information System (GIS) to help improve the analysis of change in the spatial dimension.

The GIS-based Linguistic Geography of Thailand Project was established under the sponsorship of Chulalongkorn University in 2009 in order to promote the use of GIS in linguistic studies. Up to now, the project has produced four research works: *the Atlas of Word Geography Maps of Thailand* (Teerarojanarat and Tingsabadh, 2008; 2010); *the study of the creation of the boundary map of Central and Non-Central Thai Dialects* (Teerarojanarat and Tingsabadh, 2011b); *the study of Thai dialect vocabularies and its ongoing change in the northeastern region of Thailand* (Teerarojanarat and Tingsabadh, 2011a). The latest work was *the study of Thai dialects located in the upper central region of Thailand in the transition areas of Central Thai, Northern Thai, and Northeastern Thai* (Teerarojanarat and Tingsabadh, 2012). These research works may be viewed via the GIS-based Linguistic Geography of Thailand website (http://ling.arts.chula.ac.th/geoling/). According to this latest work, language differences between two age groups were collected and investigated in terms of both lexical and phonological aspects. Results of the ongoing change based on the lexical study was concluded and recently reported in the paper entitled "Mapping Spatial Ongoing Change of Thai Dialects: A Case of Transition Area of Central Thai, Northern Thai, and Northeastern Thai" (Teerarojanarat and Tingsabadh, 2012). This paper thus reports an investigation of ongoing change on the basis of phonological study with an emphasis on the examination of both in terms of the spatial pattern and its rate of change. In the following section, the applied methodology, results and discussion are given.

Methodology and results

1. Selection of the study location

Generally, four main Thai dialects - Northern Thai, Northeastern Thai, Central Thai, and Southern Thai - are traditionally spoken in different parts of Thailand. Their names dictate the major dialect used in each region. Five provinces of Thailand were chosen as a study location to reflect the areas where mixtures of dialect usage, so-called zone of transition[2], could be found. These areas have long been observed in many Thai dialect studies as transition areas of Central Thai, Northern Thai, and Northeastern Thai (Rinprom, 1987; Chutiwat, 1991; Burusphat, 1992; Teerarojanarat and Tingsabadh, 2008; 2010). These provinces, as shown in Figure 1, included Uttraradit, Phitsanulok, Loei, Phichit, and Phetchabun. Geographically, Uttraradit is located as part of the northern region of Thailand, Loei is a part of the Northeastern region, while Phitsanulok, Phichit and Phetchabun are parts of the upper Central region.

2. Questionnaire collection and classification of dialect data

This study applied the apparent time technique to investigate generational patterns of ongoing change. Data were collected by means of questionnaire from two different

[2] The transition area, so-called the zone of transition, is considered as the area where the mixture of dialects is spoken. In the transition area, it is rather difficult for linguists to decide which dialect is dominant and where the boundaries should be drawn on map (Chambers and Trudgill, 1980)

age groups - the old generation (people aged between 50 and 60) and the young generation (people aged between 10 and 20).

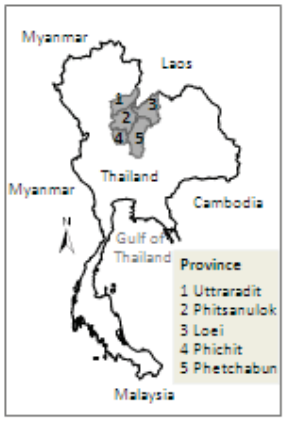

Figure 1: Map of Thailand and the study area.

A questionnaire contained 5 questions - each testing a set of sound correspondence. These five words are (1) "**ช้าง**" (elephant), (2) "**เช้า**" (morning), (3) **"ชื่อ"** (name), (4) **"เชือก"** (rope), and (5) **"เชื่อ"** (to believe). The questionnaire was modified from the one used by Chutiwat 1991. It should be noted that the questionnaire was designed to allow each informant to choose more than one sound in the correspondence set to reflect dialect usage in his/her location as it was expected that a mixture of more than one dialect is used in some area.

The questionnaire was then sent by post in December 2010 to secondary and high schools in all 5 observed provinces covering 465 subdistricts, so-called tambon in Thai. Two rounds of delivery were required to obtain the desired number of returned questionnaires. The data used in this study came from 1041 schools covering 411 subdistricts or about 88% of the study locations. The informants were a director or a teacher of a school. Data collection was completed within 5 months.

The sound correspondence set CH-C-S separates the 3 main Thai dialects under investigation – "CH" sound for Central Thai, "C" sound for Northern Thai, and "S" sound for Northeastern Thai. Table 1 lists the phonological variants containing the Ch-C-S correspondence set of the 5 words used in the study. The variants were used for producing dialect maps of the study in the next step.

3. Creation of dialect map and quantification of the rate of ongoing change

GIS played a key role in this part. GIS was used for storing and managing dialect data, mapping the pattern of dialect distribution and its ongoing change as well as quantifying the rate of its ongoing change. In the beginning, a GIS database of dialect data was created. A set of sound correspondence, classified as one of the three dialect groups from Table 1, was coded as variables identifying whether they are Central Thai, Northern Thai, or Northeastern Thai. It should be noted that because this study allowed each informant to choose more than one sound in the correspondence set, the additional variables could be in various combinations such as the usage of "Central Thai = Northern Thai" or "Central Thai > Northern Thai". For each word, an

administrative boundary map of Thailand, obtained by courtesy of the Ministry of Transportation (MOT), was then linked to the phonological variants of each word to create a phonological variation map showing sound correspondence occurrence at different localities. Similar to the display technique used in the previous work (Teerarojanarat and Tingsabadh, 2012) in this series, degree of sound correspondence usage was symbolized as colored circles. Each circle represents a subdistrict location where a dialect or a mixture of dialects is spoken. As a result, the phonological variation maps of 5 words producing from two age groups - the old generation and the young generation – were created. To sum up, a total of 10 phonological variation maps were produced. Figure 2 and Figure 3 shows an example of a phonological variation map of the word "NAME" spoken by the old generation and the young generation in order.

Table 1: A list of words with their sound correspondence variants classified by dialect used in the study.

No.	Word	The CH-C-S Correspondence set used in the three main Thai Dialects		
		Central Thai	Northern Thai	Northeastern Thai
1	ช้าง (elephant)	ช้าง /cha:ŋ^{T}/	จ๊าง /ca:ŋ^{T}/	ซ้าง /sa:ŋ^{T}/
2	เช้า (morning)	เช้า /cha:u^{T}/	เจ๊า /ca:u^{T}/	เซ้า /sa:u^{T}/
3	ชื่อ (name)	ชื่อ /chɯ:^{T}/	จื้อ /cɯ:^{T}/	ซื่อ /sɯ:^{T}/
4	เชือก (rope)	เชือก /chɯak^{T}/	เจื้อก /cɯak^{T}/ เจี๊ยก /ciak^{T}/	เซี้ยก /siak^{T}/
5	เชื่อ (to believe)	เชื่อ /chɯa^{T}/	เจื้อ /cɯa^{T}/ เจี๊ย /cia^{T}/	เซี้ย /sia^{T}/

Comparing and analyzing dialect ongoing change between the two age groups was done using the above produced phonological variation maps. A technique of "spatial join" analysis on the basis of "intersect" operation within a GIS environment was then performed to match a join point to a target point at the same location (ESRI, 2012). Based on the relative locations, a phonological variation map's attribute table of one age group will be appended to a phonological variation map's attribute table of another age group. The rate of ongoing change was also calculated and scored. Table 2 shows some exemplified records of how the rates of dialect ongoing change were coded and scored. Consequently, a dialect ongoing change map based on the phonological variation for each word was produced containing dialect data of both age groups as well as the rate of ongoing change for comparison. Results and discussion will be given in the next section.

Results and discussion

Once the main focus was on the change, some questions should be highlighted. Could the ongoing change be detected? If yes, how much did the change occur? Could we describe the spatial pattern of the change? and finally Can we predict the future change in this area?

According to the first question “Could the ongoing change be detected? If yes, how much did change occur?” The answer is “Yes, with an average amount of about 22%”.

Table 2: Some exemplified records showing how to code and score the rates of dialect ongoing change used in the study.

Case no.	Dialect Usage of Old Generation	Dialect Usage of Young Generation	Change Code	Rate of Change (in percent)
1	NE	C	NE -> C	100
2	NE	NE<C	NE -> (NE<C)	75
3	NE	NE=C	NE -> (NE=C)	50
4	NE	NE>C	NE -> (NE>C)	25

Remark: The abbreviation of “C” stands for Central Thai, “N” stands for Northern Thai, “NE” stands for Northeastern Thai, the relational operators “=, >, <” stands for equal to, greater than, and less than respectively, and the symbolic “->” stands for the ongoing change of dialect usage

Table 3 gives a summary of the overall ongoing change of the observed 5 words, calculated in the unit of percent. According to the table, the direct ongoing changes between the 3 main Thai dialects - Central Thai (C), Northern Thai (N) and Northeastern Thai (NE) were the main focus. The mixing of these main dialects such as the mixing usage of Central Thai and Northern Thai were also included to investigate the gradual ongoing change during the observed period. For example, the column “NE->C” includes the direct ongoing change from Northeastern Thai to Central Thai, the gradual ongoing change from Northeastern Thai to the mixing usage of Northeastern Thai and Central Thai, and the gradual ongoing change from the mixing usage of Northeastern Thai and Central Thai to Central Thai. Results show that ongoing change from the old generation to the young generation, an approximate 30-year period, could be detected. Surprisingly, the amount of ongoing change in all observed words was quite the same. Their amount of ongoing change range from around 19% (in the word เชื่อ (to believe)) to 24% (in the word เชือก (rope)) with an average of about 22%. Among these types of changes, the ongoing change from Northeastern Thai to Central Thai was highest at the average amount of 18%, followed by the ongoing change from Northern Thai to Central Thai (2%). Other types of ongoing change such as NE->N and C->NE were quite minimal.

Further observation focused on the ongoing change from Northeastern Thai to Central Thai (NE->C). Here, the amount of ongoing change of the observed 5 words was divided into 5 classes (or 20% interval). Once classified, the rate of change and its pattern was clearly seen. The table with the classified rate of change shows that the patterns of the rate of change of all 5 words were quite the same (see also the graph attached to the classified table). Among these patterns, the ongoing change of NE->C was found mostly at the rate of 41-60%. A rate of change below 20% was not found. The finding thus suggested that the varieties spoken in the study area are likely to change from Northeastern Thai to Central Thai. This finding was consistent with previous studies in this area e.g., the research work of Chutiwat (1991) and Burusphat (1992) in that the spread of Central Thai to other dialects was found.

The amount of *no* ongoing change was also examined to complete the overall picture of dialect usage in the study area. According to Table 3, the overall amount of *no*

ongoing change in all 5 words were quite similar, ranging from about 76% to 81% with an average of about 78%. When focusing on the types of *no* ongoing change, it could be summarized that all 5 words had a similar amount of *no* ongoing change; an average of about 39% for no ongoing change of Central Thai (C->C), 3% of Northern Thai (N->N), and about 28% of Northeastern Thai (NE->NE).

The spread of Central Thai to other dialects in the previous finding thus leads to the second question: "Could we describe the spatial pattern of the change?"

To give an answer, the ongoing change maps of all 5 words as well as the phonological variation maps were examined. Figure 2, Figure 3, and Figure 4 show exemplified maps of the word "NAME" in different views for spatial investigation. By observing the phonological variation maps of all words, it can be concluded that the spatial pattern of ongoing change for each age group was quite the same. Shown as examples in Figure 2 and Figure 3, people in Phichit province, the western part of Phitsanulok province and the southern part of Phetchabun province spoke Central Thai while people in Uttraradit province commonly spoke Northern Thai. In other areas, Northeastern Thai was dominant.

By observing the patterns of ongoing change, similar patterns among all words were found (see Figure 5 (left)). In the areas where Central Thai was spoken such as in Phichit, *no* ongoing change was prevailing. In the areas where Northeastern Thai and Northern Thai was mainly used, the ongoing change occurred. Among these changes, the ongoing change from Northeastern Thai to Central Thai was frequently found in the eastern and northeastern parts of the study area where most parts of Loei province and the eastern part of Phetchabun province are located. In Loei, the ongoing change occurred in the clustering pattern. On the contrary, the ongoing change in Phetchabun province occurred in the north-south linear pattern. Smaller ongoing change from Northern Thai to Central Thai was also found as clusters in the western part of Uttraradit.

Similar to the previous work of Teerarojanarat and Tingsabadh (2012) in lexical study, topography and locations of urban areas of each province were given as a reference as shown in Figure 5 (right) to help investigate the spatial pattern of ongoing change. It was clear that the ongoing change occurred around the cores of urban communities. In Loei province where the areas around the urban communities are flat, for example, the ongoing change was found in a clustering pattern. In Phetchabun, on the contrary, the ongoing change found in the north-south linear pattern as the mountains are located in both the eastern and the western parts of the provinces, leaving the flat area where people settle in the linear pattern. The finding thus is in accordance with the previous work (Teerarojanarat and Tingsabadh, 2012) in that the shape of the ongoing change patterns is influenced by the effect of topography and locations of urban areas.

The rates of ongoing change, classified on the basis of 20% interval, were also observed spatially (see Figure 4 and Figure 5 (left)). This gives a clearer view of how different rates of ongoing change are distributed. Our study focused on Loei and Phetchabun where most changes were detected. In Loei, rates of ongoing change occurred variedly at ranges of 21–60%. In northern Phetchabun, rates of ongoing change occurred at ranges of 41-60%. In southern Phetchabun, rates of ongoing

change occurred variedly at ranges of 21–60% in the word “elephant”, “morning” and “rope” and at rates of 61-80% in the word “name” and “to believe”. The finding thus shows that although the distribution pattern – clustering and spread – of ongoing change in all words were quite similar, their rates were different.

To the last question “Can we predict the future change in this area?”. This study shows that phonologically speaking Central Thai will bring about changes in the other two dialects concentrating in the urban areas. The prediction however cannot be carried out on the basis of just phonological evidence. We must compile the results of both lexical and phonological variation to have a more comprehensive picture.

At this point, we can conclude that without the integration of GIS and map techniques. It is quite difficult to interpret the dialect ongoing change, especially in the spatial dimension. GIS provides the spatial tools and functions, mainly for map overlay, cartographic display, and quantification of dialect change. In our case GIS facilitates the way to compute the percentage rate of change. As well, different views of maps can easily be produced to help interpret the change. With the help of GIS, researchers can thus learn and get better understanding on exploring the spatial pattern and its rate of dialect ongoing change. In our case, some questions are left to linguists to find the reasons behind these changes, including social and cultural changes, history, migration, innovation, or advancement in communication and transportation etc.

Conclusion and further work

This paper presents a way by which the spatial-based technique using GIS was applied to study the dialect ongoing change. Language differences between two age groups were investigated using the CH-C-S correspondence set. The result shows that the amount of ongoing change in all words was quite similar. The ongoing change from Northeastern Thai to Central Thai was found mostly, especially in Loei and some parts of Phetchabun, with the rate or speed of change between 41-60%. In terms of spatial distribution, the clustering and spread of ongoing change in all words were in a similar pattern, but their rates varied. Further analysis will be on the same location, but will focus on the comparison of the results of the two methods -the lexical and phonological study - for each age group.

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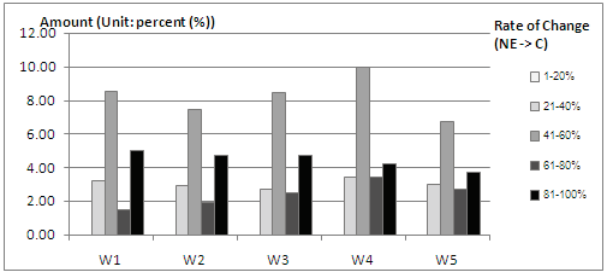
Table 3: Comparison of the degree of the dialect variation by age of the 5 words observed from the study locations (unit: percent).

Word	TYPE OF *NO* ONGOING CHANGE				Sum of	TYPE OF ONGOING CHANGE						Sum of	Total
	C->C	N->N	NE->NE	Other types	*No* ongoing change	C -> N	C -> NE	N -> C	NE -> C	N -> NE	NE -> N	ongoing change type	SUM
W1	39.85	3.01	26.82	7.76	77.44	0.25	1.75	2.00	18.31	0.00	0.25	22.56	100.00
W2	38.55	3.23	27.86	9.70	79.34	0.25	1.00	1.50	17.16	0.25	0.50	20.66	100.00
W3	39.25	2.75	27.75	8.25	78.00	0.00	1.00	2.25	18.50	0.25	0.00	22.00	100.00
W4	38.15	2.74	26.68	7.99	75.56	0.00	1.00	1.99	21.20	0.00	0.25	24.44	100.00
W5	39.19	3.27	29.90	8.54	80.90	0.00	0.76	1.50	16.34	0.00	0.50	19.10	100.00
Average	39.00	3.00	27.80	8.45	78.25	0.10	1.10	1.85	18.30	0.10	0.30	21.75	
S.d.	0.66	0.25	1.29	0.76	2.01	0.14	0.38	0.33	1.84	0.14	0.21	2.01	

Rate of Change (NE->C)	**W1**	**W2**	**W3**	**W4**	**W5**
0-20%	0.00	0.00	0.00	0.00	0.00
21-40%	3.26	2.99	2.75	3.49	3.02
41-60%	8.52	7.46	8.50	9.98	6.78
61-80%	1.51	1.98	2.50	3.49	2.77
81-100%	5.02	4.73	4.75	4.24	3.77
Total	18.31	17.16	18.50	21.20	16.34



Remark:

1. In the "Word" column, the abbreviation of "W1" stands for ช้าง (elephant), "W2" for เช้า (morning), "W3" for ชื่อ (name), "W4" for เชือก (rope), "W5" for เชื่อ (to believe).
2. In the "TYPE OF NO ONGOING CHANGE" column, the abbreviation of "C" stands for Central Thai, "N" stands for Northern Thai, "NE" stands for Northeastern Thai, and "Other types" stands for other types of no change.
3. In the "TYPE OF ONGOING CHANGE" column, the abbreviation of "C -> N" stands for the combination of the ongoing change from Central Thai to Northern Thai, from Central Thai to the mixing usage of Central Thai and Northern Thai, and from the mixing usage of Central Thai and Northern Thai to Northern Thai, "C -> NE" stands for the combination of the ongoing change from Central Thai to Northeastern Thai, from Central Thai to the mixing usage of Central Thai and Northeastern Thai, and from the mixing usage of Central Thai and Northeastern Thai to Northeastern Thai. "N -> C" stands for the combination of the ongoing change from Northern Thai to Central Thai, from Northern Thai to the mixing usage of Central Thai and Northern Thai, and from the mixing usage of Central Thai and Northern Thai to Central Thai, "NE -> C" stands for the combination of the ongoing change from Northeastern Thai to Central Thai, from Northeastern Thai to the mixing usage of Central Thai and Northeastern Thai, and from the mixing usage of Central Thai and Northeastern Thai to Central Thai, "N-> NE" stands for the combination of the ongoing change from Northern Thai to Northeastern Thai, from Northern Thai to the mixing usage of Northern Thai and Northeastern Thai, and from the mixing usage of Northern Thai and Northeastern Thai to Northeastern Thai. "NE -> N" stands for the combination of the ongoing change from Northeastern Thai to Northern Thai, from Northeastern Thai to the mixing usage of Northern Thai and Northeastern Thai, and from the mixing usage of Northern Thai and Northeastern Thai to Northern Thai.
4. The symbolic "->" stands for the ongoing change of dialect usage, observed from the old generation to the young generation in approximately 30 years.

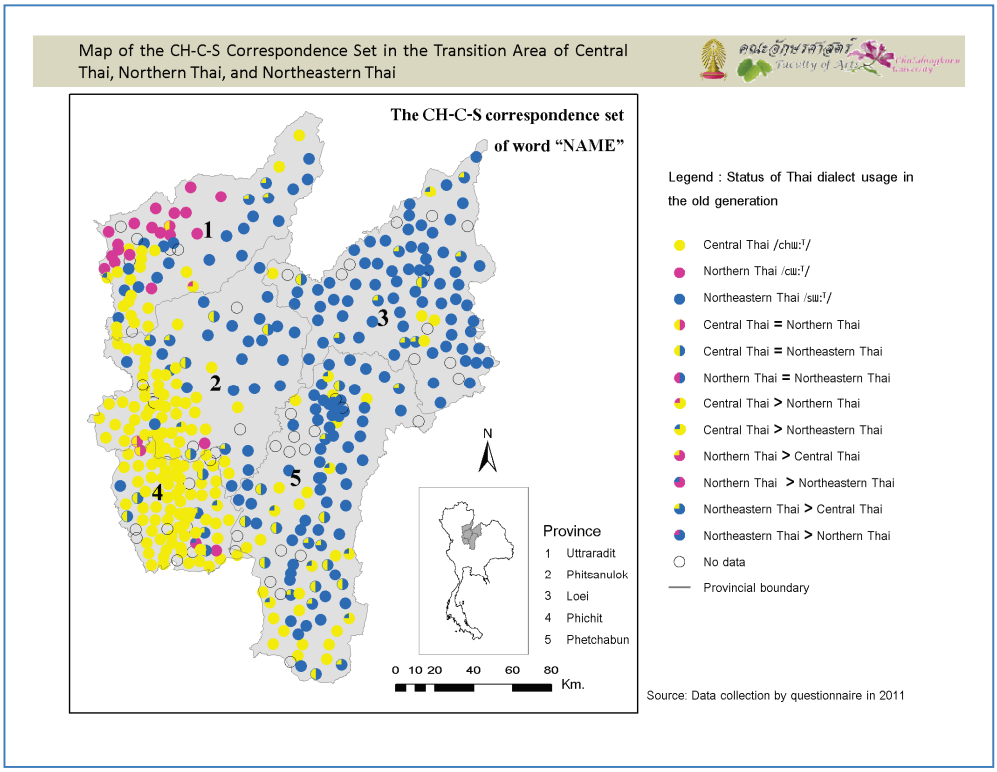


Figure 2: A phonological variation map of the word "NAME", spoken by the old generation (people between the ages of 50 and 60).

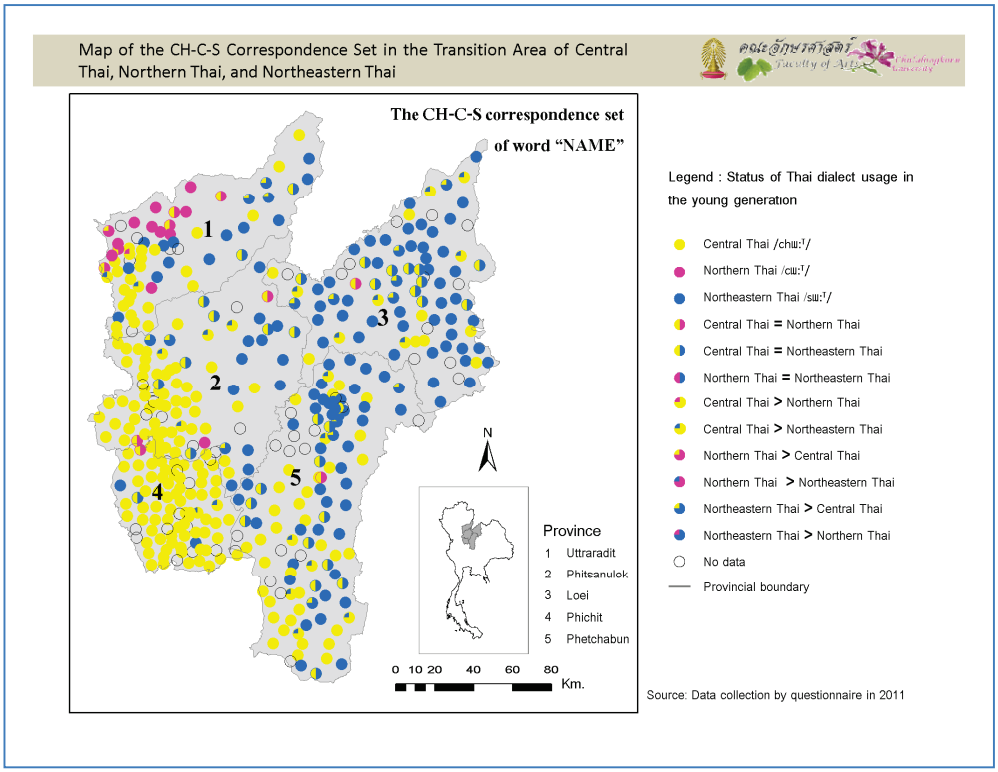


Figure 3: A phonological variation map of the word "NAME", spoken by the young generation (people between the ages of 10 and 20).

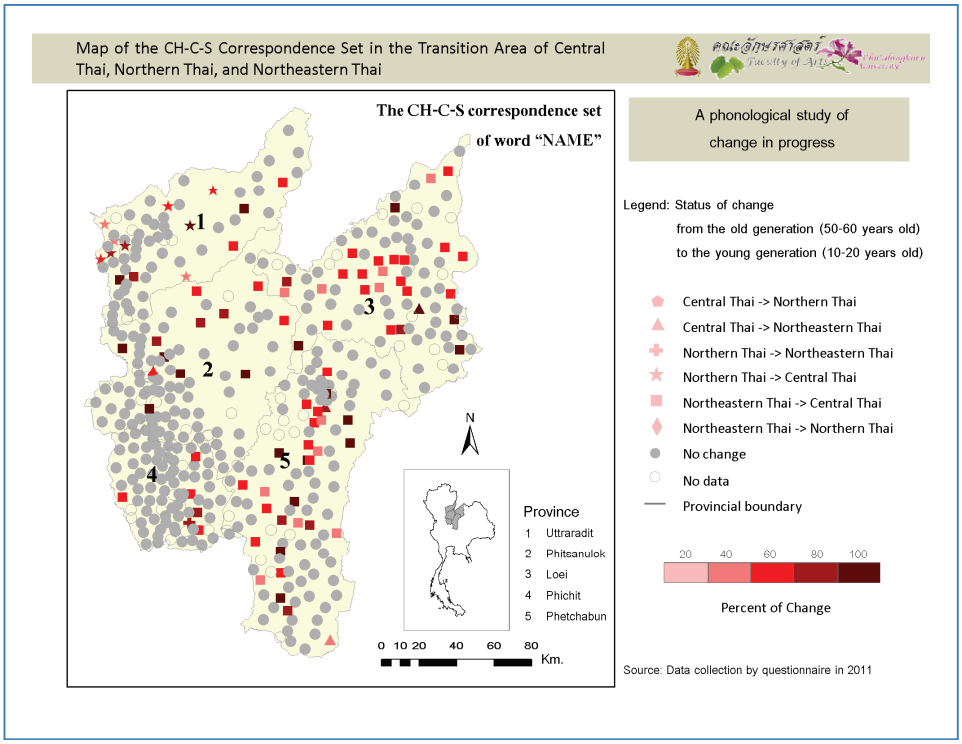


Figure 4: A dialect ongoing change map of the word "NAME" showing rate of percentage change from the old generation (people between the ages of 50 and 60) to the young generation ((people between the ages of 50 and 60) in comparison.

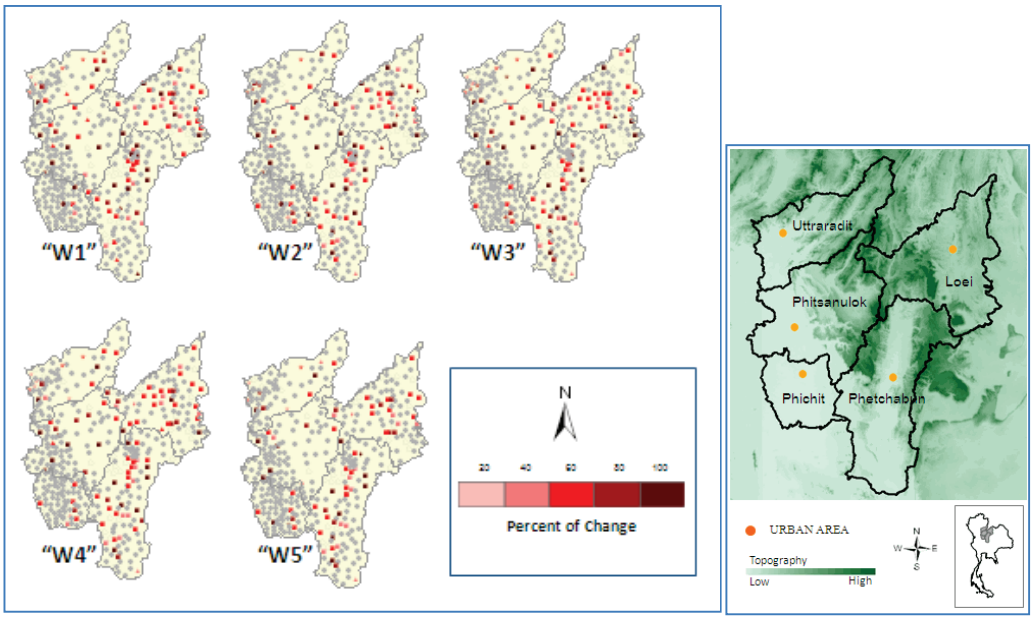


Figure 5: The ongoing change map of all words in comparison. "W1" stands for ช้าง (elephant), "W2" for เช้า (morning), "W3" for ชื่อ (name), "W4" for เชือก (rope), and "W5" for เชื่อ (to believe) (left), comparing to the topography and urban communities of the study area (right).