# EXTRACTING FAMILY GENEALOGIES FROM TAIWAN'S TOMBSTONES FOR A STUDY OF HISTORICAL CHANGES IN TOMBSTONE INSCRIPTIONS

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***Abstract*** *In this paper we approach the paradigmatic changes in the inscriptions of Taiwan's tombstones not as statistic phenomenon which can be traced on maps and timelines, but as phenomena that occurred in the history of individual families. For this purpose, tombstones are connected into networks of family relations, created through references from different tombstones to a common set of person. Using the edges of these tombstone networks in a chronological order, we obtain a workable data structure for follow transformations in a family line. The unexpected problems we encoutered with this research approach, e.g. the only regional references to mourners by names and the reduction of workable data with each processing step are discussed and possible solutions are suggested.*

**Keywords:** Taiwan, Tombstone Archive, Tanghao, Extracting Names, Extracting Family Relations

## 1. INTRODUCTION

### *1.1 The ThakBong Project*

The research presented here is part of the larger documentation, archiving and research project ThakBong[1], introduced in Streiter, Goudin and Huang (2011), Streiter and Goudin (2011) and Streiter and Goudin (2013). In this project, digital data, photos, video and maps, describing Taiwan's gravesites are created, collected, annotated, archived, distributed and used in cultural studies. The wide

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geographic and temporal scope of this project and the extensive application of information technologies leads to new approaches in anthropological studies. Generalising our approach, we proposed in Streiter and Goudin (2013) a *Digital Anthropology*, which unlike Cultural Anthropology, focusses on the synchronic and diachronic variation of practices instead of the understanding of emic concepts.

The sub-branch of Cultural Anthropology called also *Digital Anthropology*, the anthropological analysis of so-called digital tribes, is only in so far related to our research, as we are interested in the question, who are the anthropologists that go or don't go digital and what are the opposing forces these two groups encounter. More importantly, our focus on cultural variation confronts scholarly or political writings that treat cultures as monolithic entities. We don't range such monolithic writings with our scientific literature, but with the data we analyse. No matter whether these texts origin from the pen of a self-declared scholars or a high-ranked politician, we try to reveal the contradiction between the empirical data and the printed discourse, as this ideological discourse, e.g. of a nation state, influences not only practices, the object of our study, but also the their emic understanding Streiter and Goudin (2013) of the practitioners. A primary research focus on emic notions, e.g. under a nation state, could not disentangle research findings from statal ideologies that are inherent, for example, in data categories.

Fundamental to our approach is the decomposition of practices into features. A feature is a unique combination of an attribute, e.g. *direction*, a value, e.g. *180* and if necessary a unit, e.g. *degree*. We create digital objects, called *graveyard*, *tomb*, *tombstone* and *person* for the equivalent real-world objects in our audio-visual material. These digital objects serve as bundles of features, which capture, according to the object, surnames, given names, life data, ethnicity, gender, placenames, symbols, script, transcription, offerings and geo-references. The distribution of these features can then be analysed in relation to features like space, time, gender or ethnicity.

### *1.2 From Focus Position to Identity Claims*

Most tombstones in Taiwan are written with a Chinese script, usually in the direction from top to bottom. The top part of these tombstones, written mainly from right to left, is what we call the *focus position*[2]. The focus is thus marked by its flipped writing direction in that area of the tombstone, from where the reading of most lines starts. The content of a focus can be described by its *semantic role*.

The semantic role characterizes the semantic relation of an epitaphic phrase to the deceased. Semantic roles vary from community to community. Examples are: *date of birth*, *placename*, *religion*, *generation*, *profession*, *political affiliation*, *buried with* and *mourners*. Most semantic roles, with exception of the


**Figure 1.** Han ethnicity: 漢 (Han).

focus, vary from tomb to tomb within a graveyard, stressing the particularities of the deceased.

The main function of the focus position is to create and stress similarity with real or imagined communities. Other properties of the inscriptions that are shared among different tombstones, such as the script or the type of calendar, reflect a broader and unconsciously accepted cultural background. The expression of similarity in the focus is struggled over by a number of agents, such as political institutions and their representatives, funerary professionals, the community and the family of the deceased.

Figure 1 to 10 illustrate different semantic roles in focus position. Figure 7 to 10 show placenames in focus position. Figure 7 to 9 show different reference types of placenames. Figure 7 and 10 contrast placename types, here placenames with and without the character '邑' (yi), meaning *place*, a substitution of mostly the second character of a placename.


**Figure 2.** Qing Dynasty: 皇清 (huang qing).

### *1.3 Changing Identity Claims*

The digital documentation of Taiwan's tombs has revealed paradigmatic changes in the way Taiwanese built their tombs and inscribed their tombstones, see Streiter, Goudin, Huang, Lin and Yen (2010) and Streiter, Goudin and Lu (2013). Most of these changes relate to how Taiwan was politically embedded in its Asian context, either by the Qing government, the Japanese government, or the Republic of China (ROC) ruled by the autocratic Chinese nationalistic Kuomintang (KMT). The ROC arrived on Taiwan, as earlier forces, in the aftermath of a war. But it brought also all its political institutions and more than one million refugees, the so-called '*Mainlanders*'. The toppling of regimes had a direct impact on the funeral practices of the local people through the threat the new regime constituted to the people, through new administrative regulations, and through template-funerals organised by official agents, such as the army, hospitals or politicians. Changes were also introduced through the tactics and

**Figure 3.** Japanese emperor: 皇曰 (huang ri).

trickeries with which local people adapted to these forces, see de Certeau, Giard and Mayol (1980) and Streiter, Goudin and Lu (2013).

In Penghu, a state-controlled hub of military and commercial importance, the expression of loyalty to the Qing Dynasty was the most common focus in the late Qing period. This focus was immediately abandoned in 1895, when Japan occupied the islands. The local people, who had witnessed the use of military force, apparently understood the risk of a loyalty expression devoted to the Qing. In this unstable political situation, even a switch to an expression of loyalty to the Japanese emperor might have been risky, in case Penghu would return to China after some years. As the tombstones in Penghu had no alternative semantic role that could be promoted into the focus position, people adopted a new focus, the tanghao.

Through this double trickery, the reference to the Qing was given up, but a new reference to the Chinese history of division and reunification was created.


**Figure 4.** Kuomintang (KMT): symbol.

When drawn on a map, the set of tanghao circumscribe the area ruled by the Northern Song Dynasty (960–1127), which was lost to the Jurchen Jin Dynasty (1115–1234) and reunited later by the Mongolian Yuan Dynasty (1279–1368). Despite this reference to the Chinese history, the Japanese authorities tolerated the tanghao.[3]

On Taiwan, not the expression of loyalty but the jiguan was the most common focus during late Qing. No urgent changes in tombstone inscriptions where required after the Japanese takeover, as the Japanese were eager to know as much as possible about their colonial population, see Ino (1904) and Hsu (2013). Nevertheless, the jiguan was gradually replaced by either a tanghao or a local Taiwanese placename. During the ROC period, the tanghao was further promoted by the KMT, see Yang (1979), Taiwan Provincial Government (1979), Yang (1980) and Streiter and Goudin (2013). From the 1980s on, the tanghao became the dominant reference type in most regions of Taiwan, see Figure 13.


**Figure 5.** Generation number: 廿二 (22).

The region, where the Taiwanese placename became the most common reference type is, from the Japanese period until today, Tainan and its neighboring counties in Jiayi and Kaohsiung. Tainan was the capital of the Republic of Formosa that opposed the Japanese annexation of Taiwan, it was Tainan that was defeated last in October 1895 and it is this region that was inhabited by the Taiwanese since 1600. A shift from the jiguan to the Taiwanese placename again can be understood as double trickery, which might please the Japanese authorities as a shift away from China, but at the same time reflects the pride and regional identity of the people in Taiwan's south-west.

### *1.4 Research Question*

In previous research, we demonstrated on a sample of tombstones that the forms and inscriptions changed in Taiwan and Penghu and developed new forms, and with them new identity claims. Most Taiwanese would deny the possibility

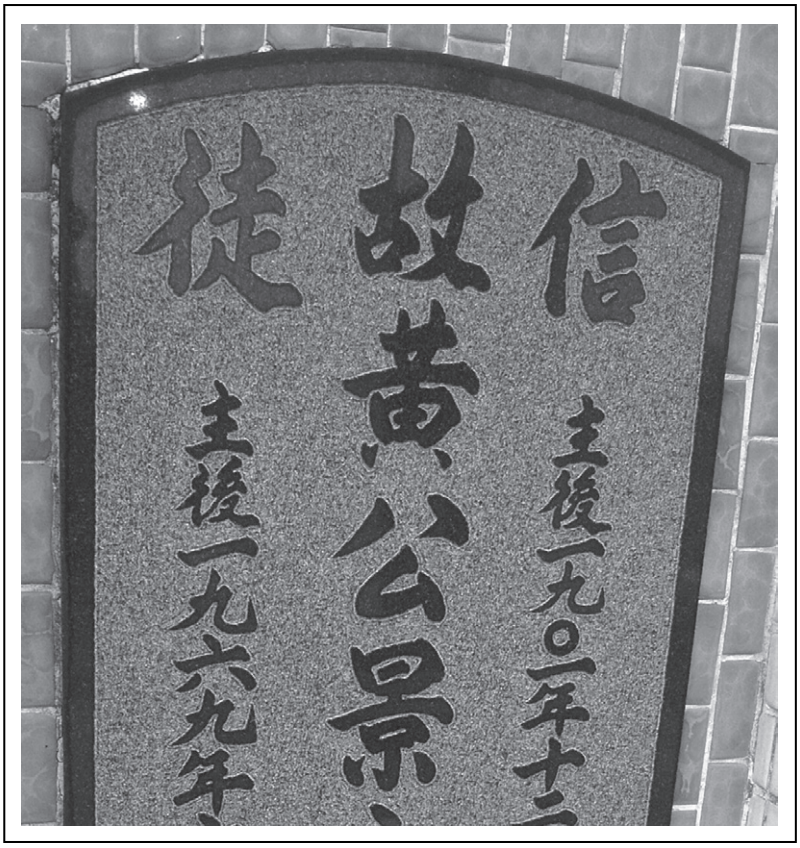


**Figure 6.** Christianity: 信徒 (xintu/believer) and cross.

of such a change in their family line and consider the placename on their grandfather's tombstone to be a continuation of the placename on the tombstone of grandfather's ancestors. Indeed, the observed changes within a region don't imply a change within family lines. Other phenomena may have caused them. People may have migrated in the course of the last 120 years to or from that region, or tombs with specific features may have become inaccessible.

To show that Taiwanese families in fact changed their identity claims on tombstones, it is necessary to study individual family histories and to see, whether, for example father and son show different identity claims. The comparison of such instances might help to understand the context of these changes. Also, the analysis might reveal whether tombs linked through family lines are conservative and preserve features longer than unrelated tombs of


**Figure 7.** Jiguan: 江西 (Jiangxi).

the same community. In previous research we had to autumn back on the hypothetical effect of family traditions to explain the continuation of a largely minoritarian and politically dangerous tombstone feature, see Streiter, Goudin and Lu (2013). Any information on the strength of such family traditions would thus improve our understanding of how practices develop or transform.

## 2. RESEARCH METHOD

The immediate purpose of this research is thus to filter out from the total sample of tombstones a sub-sample that is still representative of the total population and that allows to study the development of the focus position along family lines.

### *2.1 Linking Tombstones through Names*

When families disinter their ancestors and relocate their bones in a family columbarium (bong-chhu), they normally destroy the original tombstones. But

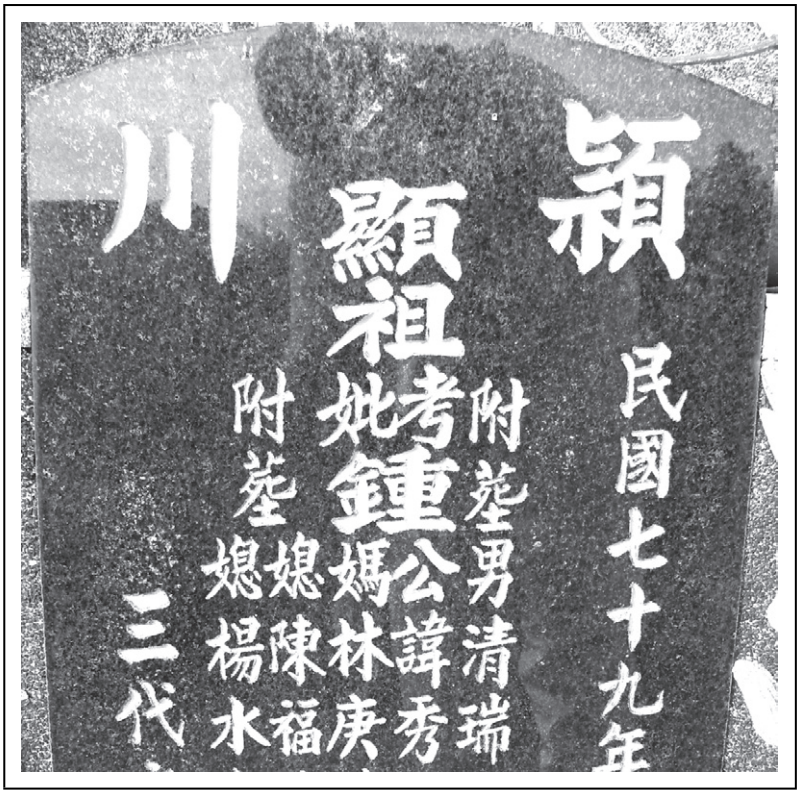


**Figure 8.** Tanghao: 潁川 (Yingchuan).

sometimes, they keep the stones near the columbarium as shown in Figure 15. Through names and dates the changes in tombstone transcriptions can then be traced easily. These cases however are specific not frequent enough to serve as exclusive source for our research. Still, this example shows that tombstones can be linked through the inscription of names and dates, even if, as in most cases, the tombstones are not physically grouped together.

Yet, this example also raises a methodological question. In Figure 15, the placename that is different from all the other placenames is the jiguan Yintong (銀同) of a woman surnamed Qiu (邱), who married into the Lin (林) family. It is unclear thus whether this jiguan in Figure 15 represents the family tradition of the Lin or the Qiu family. If there were an older male tomb with the same jiguan, Yintong would be the Lin family jiguan. If there were an older male tomb with another jiguan, Yintong would be a Qiu jiguan. If there were an older male tomb with the same tanghao Xihe (西河), we still would not know. Thus,


**Figure 9.** Taiwanese placename: 大社 (Dashe).

in such a case, it is impossible to decide whether the focus changed in the family line or not. However, if we knew that in the Taiwanese context, a woman, here surname Qiu, who married into another family, here Lin, would never continue the tradition her family, thus Qiu, we could ignore gender differences in the analysis of changing tombstone inscriptions.

The approach we thus follow is to link tombstones through names and family relations inscribed on them. The tombstones in Figure 16 and Figure 17, for example, show overlapping names. In Figure 16, the inscription referring to the deceased is: 祖考黃公清財塋, identifying a deceased man as Qingcai (清財), surnamed Huang (黃). The inscription referring to the mourners reads: 孝男(秀男/三成)孫(枝發/進淦/進發/茂祥)曾孫(智偉/智揚) and identifies, among others, the sons as Xiunan (秀男) and Sancheng (三成). This matches the inscription in Figure 17. Here the inscription referring to a deceased woman reads: 祖妣黃門蔡店墓 and identifies the deceased as Dian (店), surnamed


**Figure 10.** Placename in 邑: 饒邑 (Raoyi) meaning 饒平 (Raoping).

Cai (蔡), married Huang (黃). The inscription referring to the mourners is: 孝男(秀男/三成)孫(契禎/茂祥/進淦/進發)曾孫(智偉/智善/智揚/智宏)立 and identifies, among others, the sons as Xiunan (秀男) and Sancheng (三成). Actually, the names of all mourners except the two youngest great-grandsons are identical. This strong similarity will mark both tombstones as candidates to be linked. Each tombstone individually is already linked to a genealogy as represented on the tombstone. If all persons having the same name in the two genealogies can be merged without producing a contradiction, the merger is confirmed and new implied genealogical relations added. In this case, a person related as *男(na2n/son)* on one tombstone is also related as *男* on the other, and the surname of the man corresponds to the surname of the family the woman married into. The two deceased are thus connected with the induced relations *has son with* and *married to*.

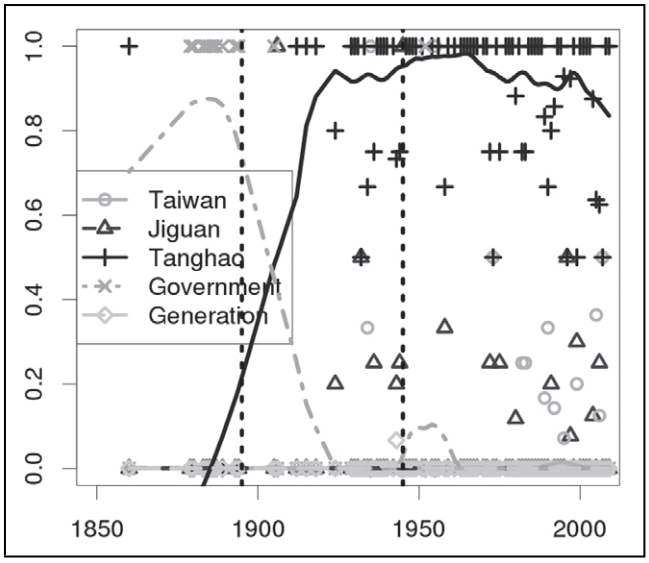


**Figure 11.** The development of the focus position on Penghu.

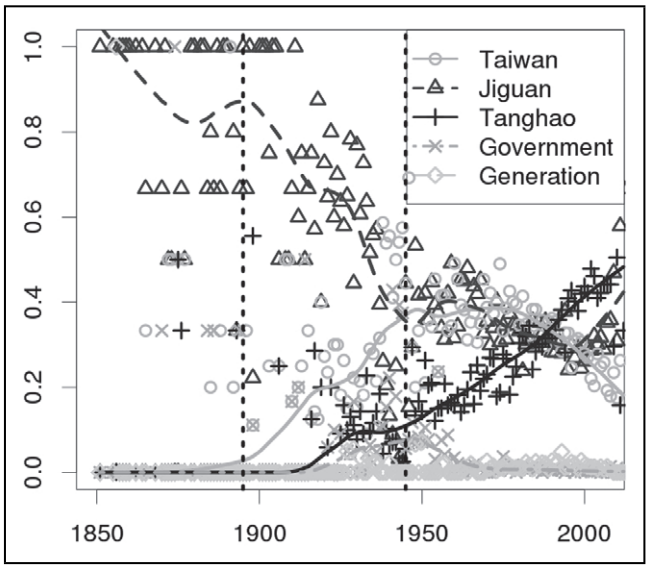


**Figure 12.** The development of the focus position on Taiwan.

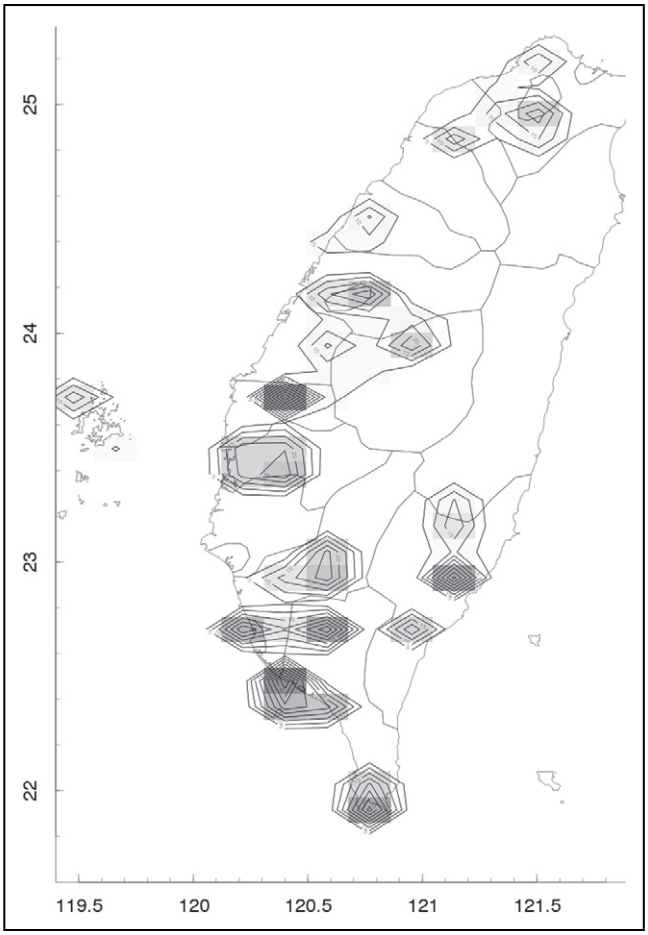


**Figure 13.** The heatmap of tanghao on tombstones in Taiwan.

### *2.2 Research Steps*

To link physically separated tombstones into family lines, we perform the following processing steps.

- Tombstones are transcribed in a random order. The transcription, enhanced with a few markup symbols tries to capture mainly the graphical representation of the characters on the tombstone. Frequently used markup symbols are the slash, which represents a newline and round brackets, which represent parallel text segments. The transcription of the mourners thus

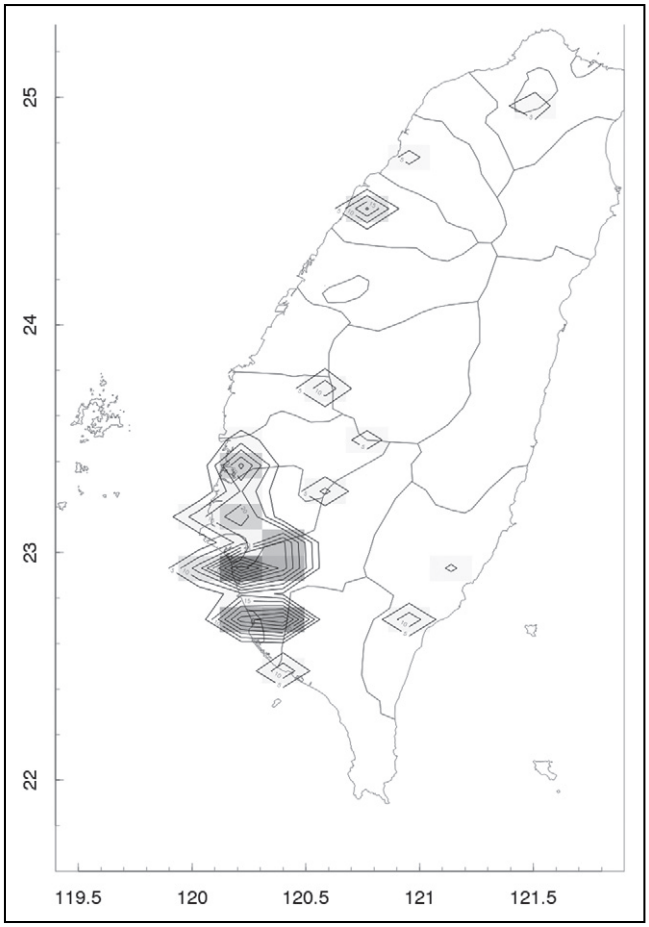


**Figure 14.** The heatmap of Taiwanese placenames on tombstones in Taiwan.

looks as follows: *(孝男/重孫)水(旺/木)孫世英*. *孝男* (devoted son), *重孫* (great-grandson) and *孫* (grandson) are relation markers with respect to the main deceased. This factorised writing, e.g. of *水旺* and *水木* as *水(旺/木)* is common, not only to reduce space, but also to obtain an auspicious number of characters, see Chen and Chen (2008).

- A semantic role is assigned to each components of the inscription. This classification, as most machine learning in this project, is done using memory-based approaches Daelemans and Bosch (2005).
- The factorised representation of mourners is transformed with regular expressions into a distributed representation. Distribution is mainly applied

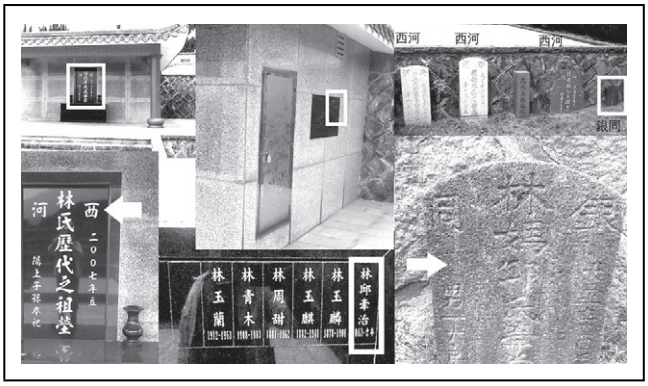


**Figure 15.** A family columbarium and beside the tombstones of the removed tombs. The oldest tombstone of the Japanese era 大正, the only female ancestor, shows a jiguan. The Japanese column-shaped tombstone of the Japanese era 昭和 has no placename. All other tombstones, including that of the columnbarium show a tanghao.

to names, and only where necessary, to relation markers. This yields the expression *孝男 水旺 重孫 水木 孫 世英*. In this representation, the scope of a relation marker ends with the appearance of the next relation maker.

- Person names are extracted and added to the family network of the deceased. Culture-specific relation markers are transformed into taxonomic terms, e.g. 孝男 into *son of*, etc. Each of these terms is associated with its relational implications, gender implications, number implications, contradictions and inverse relations.
- The network of family relations, as expressed unconventionally on the tombstone, is extended through this rule system. In our example, the automatic specification of *son of* into *unique son of* implies that the grandson is the son of the unique son. Then again, the grandson will be recognised as unique son of the son, so that the great-grandson is finally recognised as the son of the grandson.
- Two family networks are automatically marked as to be merged if passing a threshold of overlapping features. A contradiction that occurs during the merge will lead to the abortion of the operation. Networks can also be marked to be merged manually if data become available through other resources.
- A simple example of a network is shown below as a time sequence of vertices. In this specific network, the unique son was buried in 1990 with the inscription of tanghao (th) Yingchuan (潁川). His father and wife were

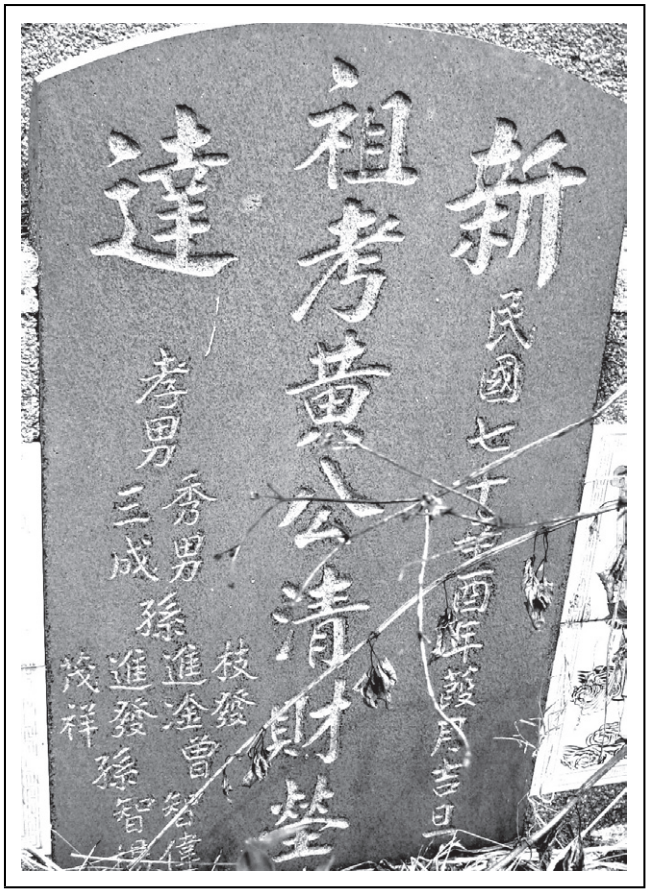


**Figure 16.** Tombstone in Luzhu.

buried in 1993, having inscribed on their tombs the village name Lupu (鹿埔) in Taiwan (tw).

1990: 陳卦 -unique-son of- 陳沙-潁川 -th-male
1993: 陳沙 -father of- 陳卦-鹿埔 -tw-male
1993: 陳黃救 -wife of- 陳卦-鹿埔 -tw-female

- As our main interest goes into the transition between connected tombstones, we compile the vertices into a list of edges. An edge, a transition between the tombstones of two successive burials, indicating in this specific case a shift from a tanghao to the Taiwanese placename between 1990 and 1993.

1990: 陳卦 -unique-son of- 陳沙-潁川 -th-male,1993: 陳沙-鹿埔 -tw-male


**Figure 17.** A second Tombstone in Luzhu with an overlapping list of mourners.

## 3. RESULTS

### *3.1 Progress*

The data collection through digital photos, the annotation and all further processing steps are simultaneously ongoing with a nominal investment of half a man-month. So far 23.000 of 40.000 tombstones have been completely transcribed, some additional 15.000 tombstones have been partially transcribed.

In total, about 35.000 tombstones have the semantic role *mourner*.[4] Of the remaining tombstones, 25% mention mourners by their names and 75% mention mourners in formulaic expressions like 三大房子孫立 (erected by three sons and grandsons), but don't name them.

Of the named mourners, about 55.000 names have been extracted with their relation to the main deceased. More than 1500 names could be linked to two of more tombstones, resulting into 540 tombstones linked in 244 networks. The largest network connects 12 tombstones. Figure 18 shows the geographic distribution of extracted networks.

Trying to understand the local clustering of extracted networks, we found some surprising outcomes. First, the naming of mourners is a regional practice, see Figure 19. In addition, the same region that refers on tombstones to Taiwanese placenames lists the mourners by name, see 14. Networks of tombstones can thus be extracted mainly in this south-western region, introducing a strong bias in the sub-sampling.

### *3.2 Analysis*

The change of the placename reference type in a family line is not uncommon. Figures 20 to 23 use the cross and the triangle to represent a change and a continuous usage of the reference type respectively.

As expected, gender seems to play a role in these changes. The data show that if the transition starts with a male ancestor, the following ancestor has, in about 92% of the cases the same reference type, no matter whether male or female. If the transition starts with a female ancestor, in less than 87% of the cases the same placename reference type is used. Using a chi-square test, this difference is with a p-value of 0.064 just not significant. Future research will thus have to clarify this difference. If we compare the transitions that end with males to those that end with females, there is no difference between these two groups, the p-value is 0.825.

Transitions for different gender relations are exemplified below, showing for each possible gender transition one example of an unchanged and a changed placename reference type.

- 1942:鄭流厘-father of-鄭旺-喜樹-tw-male,1969:鄭旺-喜樹-tw-male
- 1990:陳卦-unique son of-陳沙-穎川-th-male,1993:陳沙-鹿埔-tw-male
- 1987:陳玉桂-husband of-陳洪錯-塩田-tw-male,1987:陳洪錯-塩田-tw-female
- 1963:張-son of-張-清河-th-male,1975:張-日東-ch-female;
- 1982:黃郭愛-mother in law of-黃唐金豫-新達-tw-female,1995:黃唐金豫-新達-tw-female
- 1979:陳林樹-mother in law of-陳高桃-晉江-ch-female,1995:陳高桃-安平-tw-female
- 1998:黃陳玉梅-wife of-黃奢-新達-tw-female,2003:黃奢-新達-tw-male
- 1979:黃四-wife of-黃-泉州-ch-female,1982:黃-安平-tw-male

**Figure 18.** Extracted tombstone networks.

Given the possible gender difference, we limit our analysis to those transitions that start from male family members, reducing the total amount of transitions to 227. In these 227 transitions, in only 14 cases reference types change between jiguan, tanghao and Taiwanese placename.

To understand the contribution of family traditions in comparison to community traditions, we use a technique called *resampling*[5]. For each of the 227 transitions of family tombstones, we draw randomly a transition of tombstones


**Figure 19.** The listing of mourners by name as a local culture in Taiwan.

where the graveyard, the gender, the ethnicity and the time period are the same as in the family transitions. We call these the community transitions. We then compare the changes in the community transitions (38%), to the changes in family transitions (8%). Repeating this experiment 100 times, with each time a similar outcome, we can confirm the existence of a strong family tradition that prefers one reference type despite changes that occur in the community. These family traditions last about 12 tombstones with an average interval of 6 years, thus 70 years or three generations. At the level of the community,

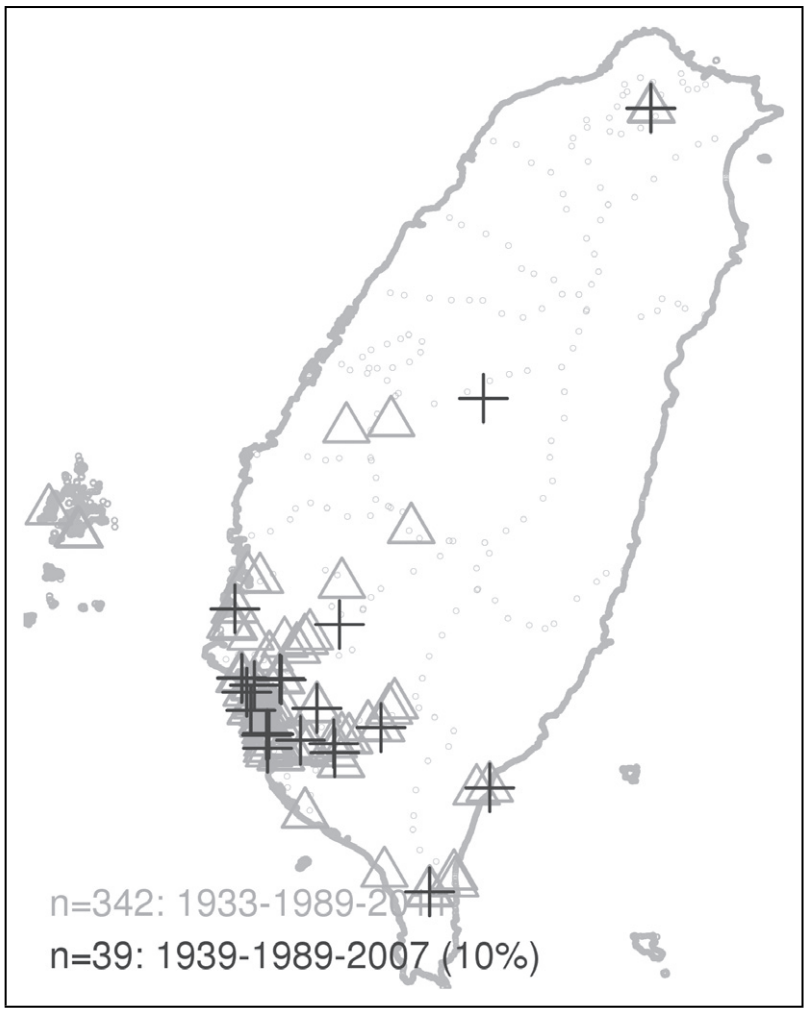


**Figure 20.** Changes in the placename reference type, indicated by a cross.

different placename traditions are kept alive simultaneously, of which two, the tanghao and the Taiwanese placename don't require an extensive knowledge of the family history. The community thus at any time allows to swap to one of these.

As shown in Figure 25 to 30, the Taiwanese placename is the most attractive, with 43% of all changes going towards it and only 5% away from it. The jiguan is less stable with 31% of changes versus the jiguan and 17% away from it.

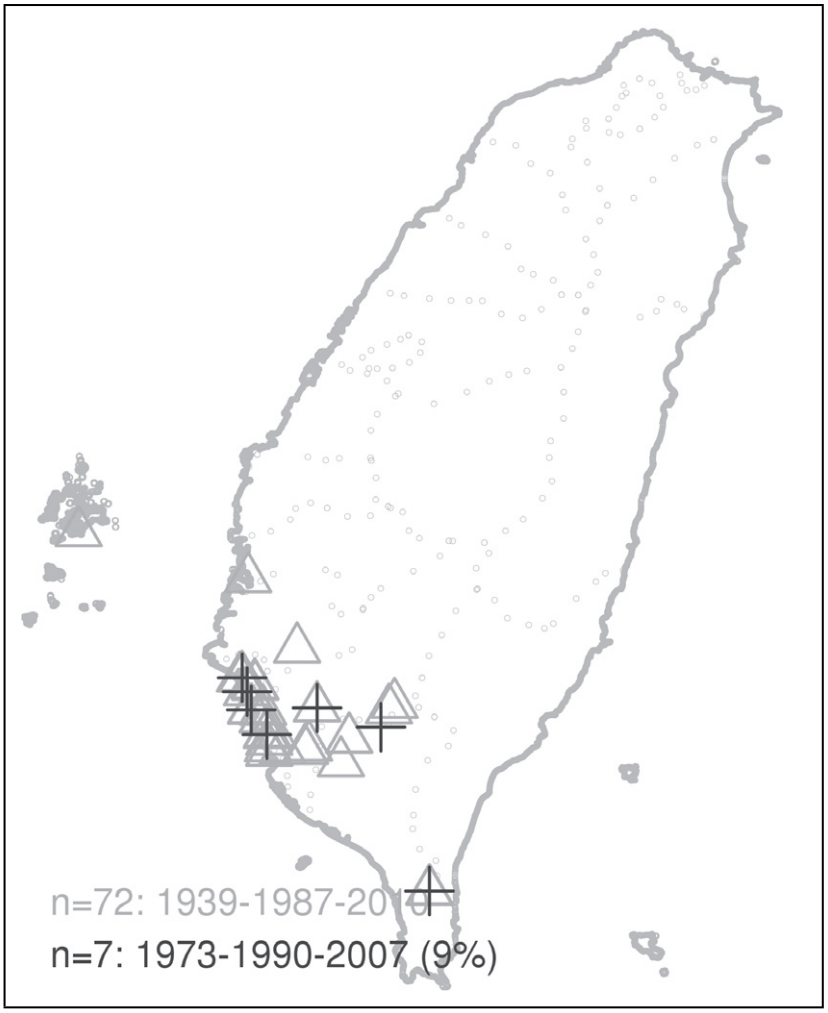


**Figure 21.** Male to male.

With only 25% changes versus a tanghao and 18% away from the tanghao, the tanghao is the least attractive in this region. The relative high number of changes towards the jiguan is unexpected, as the jiguan requires concrete knowledge of the family history. However in the second half of the Japanese period, new jiguan names have sprung up, which refer to larger administrative or linguistic areas, such as Quanzhou (泉州), Zhangzhou (漳州), Fuzhou (福州) or Meixian (梅縣),

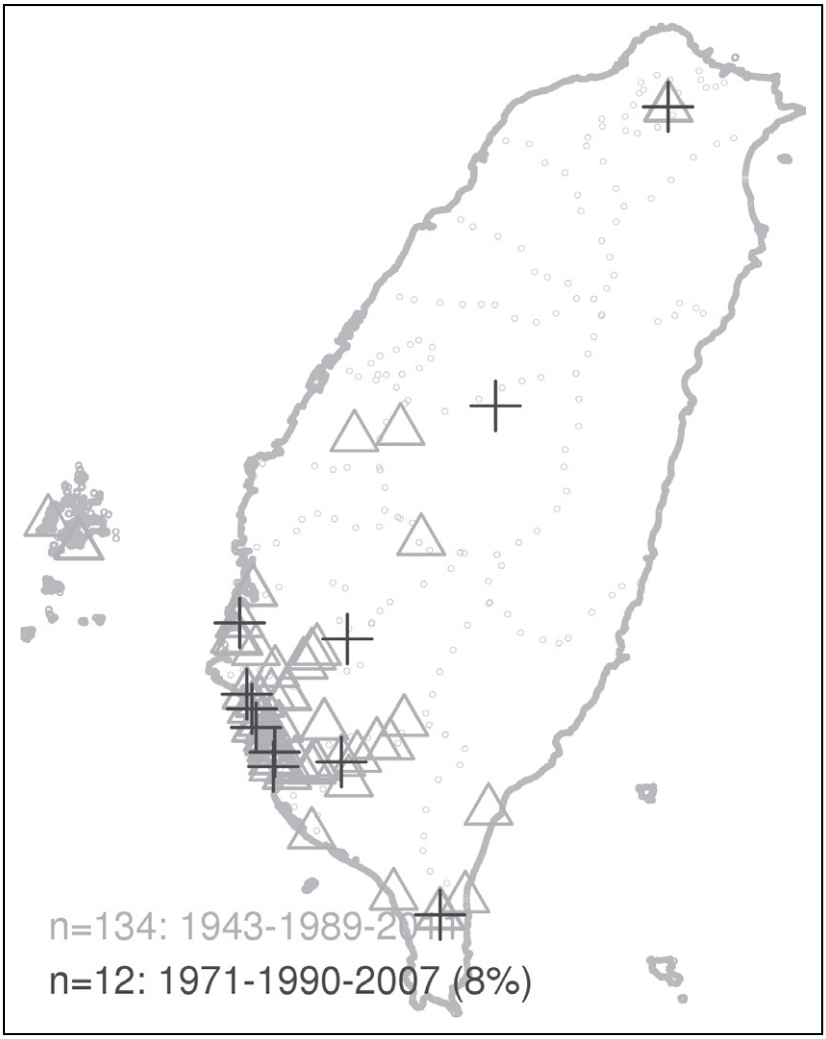


**Figure 22.** Male to female.

see 31. 60% of all changes towards a jiguan are actually accounted for by these new jiguan.

## 4. SUMMARY AND DISCUSSION

In this paper we explained the creation of a new data structure for the quantitative analyses on the contexts under which people change traditional tombstone

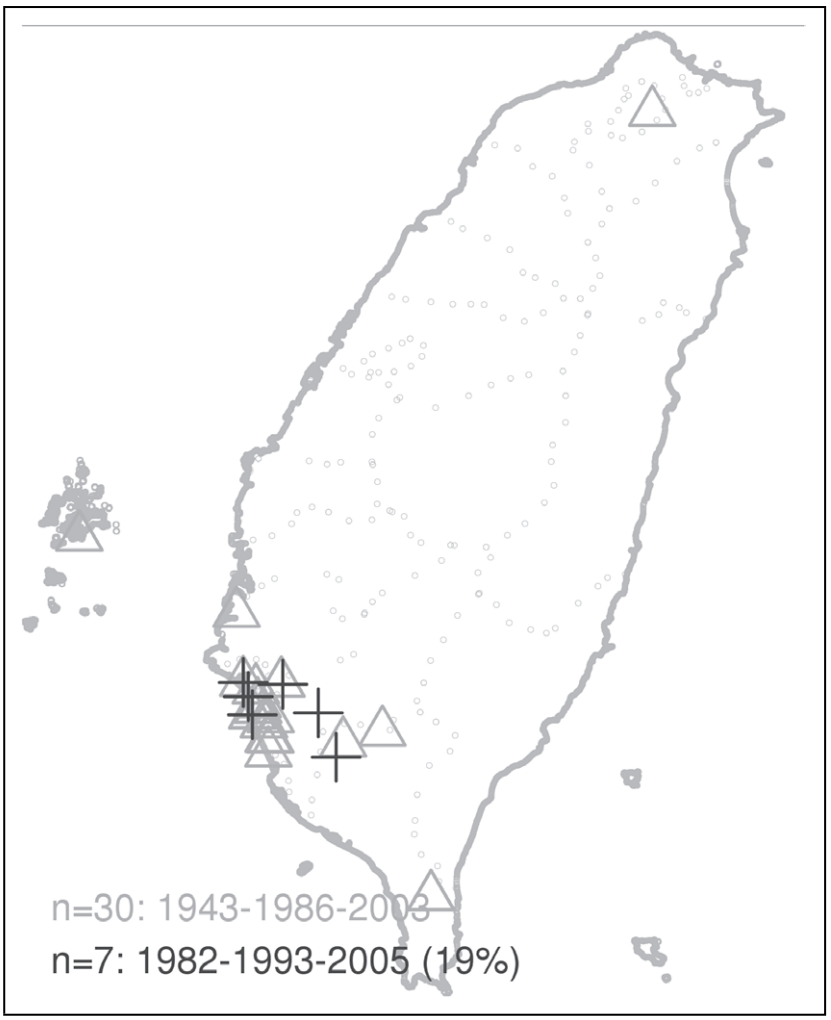


**Figure 23.** Female to female.

inscriptions. Although most of our work went into the collection and annotation of the data, and much more data will be required to understand the regularities in these changes, already a number of insights and questions have sprung up from this work.

First and most important, Taiwanese families indeed changed in the course of history the reference type of the placename on their tombstones, statistically seen in the fourth generation.

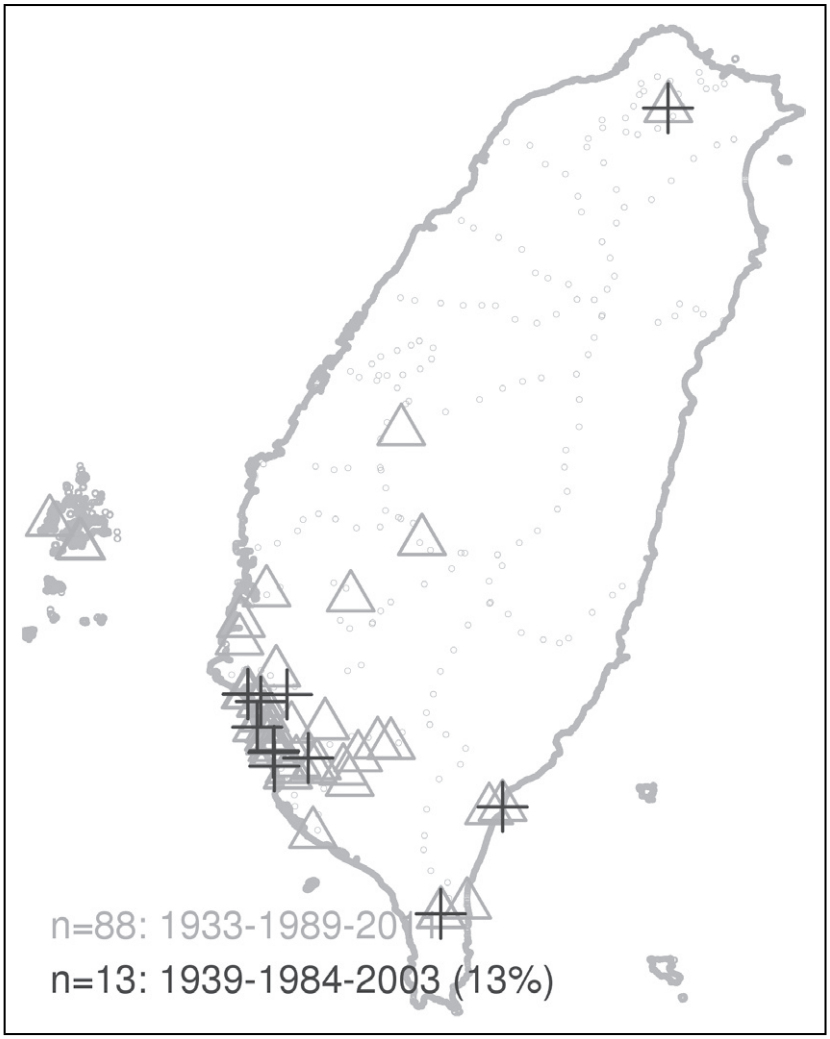


**Figure 24.** Female to male.

Second, the role of the placename of women needs further clarification. The current data are not conclusive as to whether women buried before their husbands or father-in-law really have more freedom to adopt a placename than after their burial. Chances are high that with more data, this tendency can be confirmed. If so, this would change the way to look at funerary traditions. Especially in times of WWII and the consecutive persecution and murdering of people during the KMT white terror, changes in tombstone traditions might have

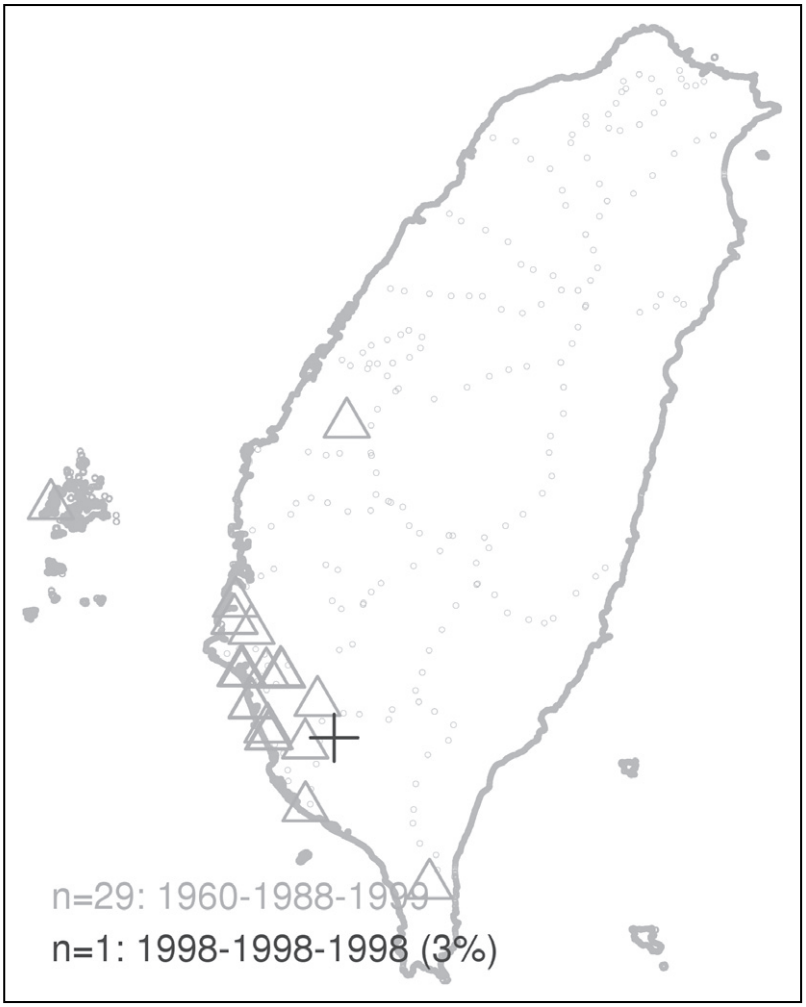


**Figure 25.** Transition from jiguan to tanghao.

been brought about by the absence of male tombs. The tombs of WWII soldiers, see Streiter, Goudin and Lu (2013), or victims of the white terror could often not be located by their family members. Even if they were properly buried by a mortuary by the Japanese or the KMT, their tombs didn't create templates that families would like to follow. Many tombs of the white terror, for example, only report the name of the victim and the date of the execution. It is thus possible that in the absence of male tombs, female tombs became the templates for the

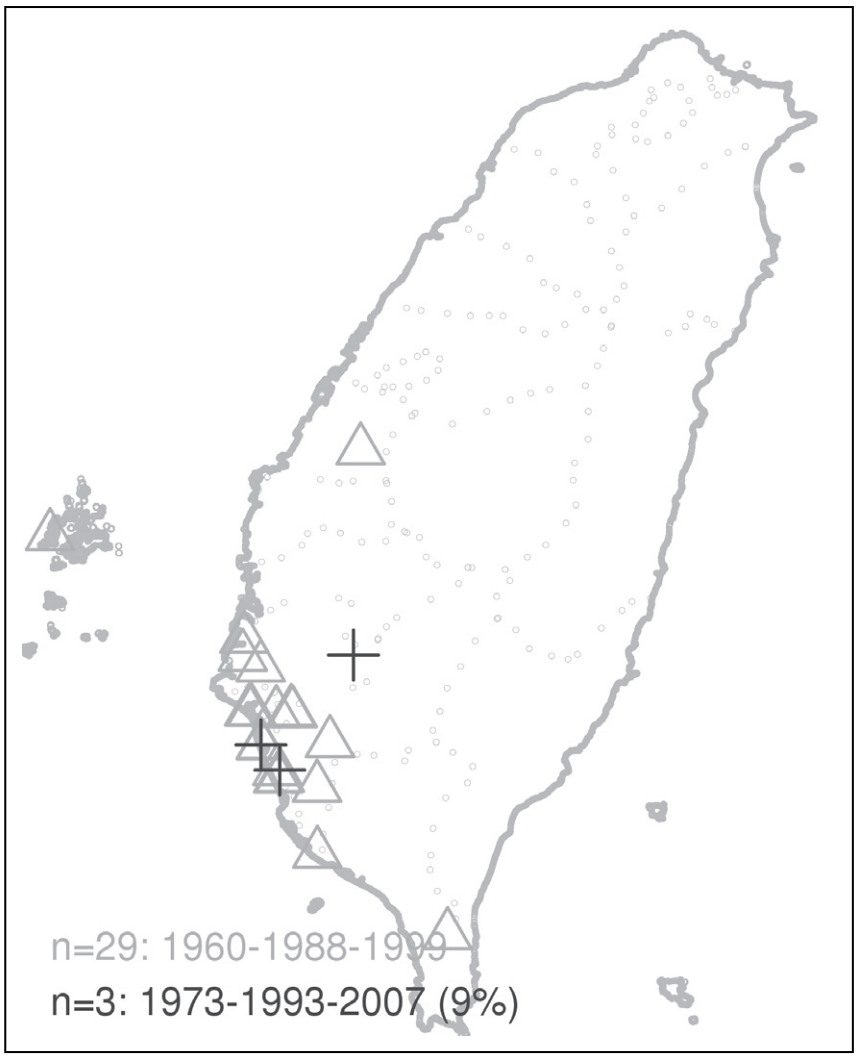


**Figure 26.** Transition from jiguan to Taiwan.

tombs of the children from the onset of WWII in 1939 to the end of the white terror in 1987.

Third, we observe that the changes follow the *relevance principle*, according to which human behaviour is guided by the combined principle of a minimal investment for a maximal effect, see Sperber (1996). The Taiwanese placename is a perfect illustration of this principle, as it requires little cognitive effort


**Figure 27.** Transition from tanghao to jiguan.

and basically no knowledge of a family history. The observed change of jiguan towards less precise geographic references seems to confirm this trend.

Likewise, the evocation of a tanghao seems to correspond to the formulaic expressions which don't name the mourners. This at least is what Figure 32 suggests through the comparison of the correlation of three tanghao distributions. The first distribution is a model, according to which all people represented in

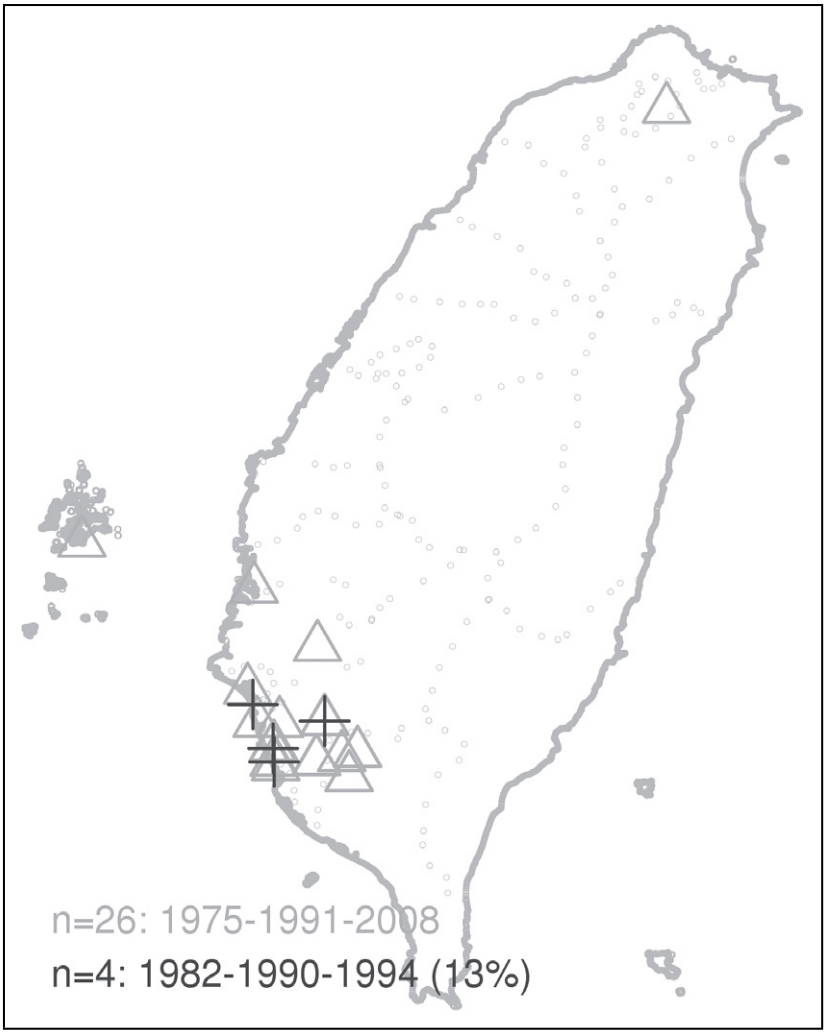


**Figure 28.** Transition from tanghao to Taiwan.

the census of 1956, see Chen and Fried (1968), select the tanghao according to the Book of Hundred Family Names, the *Baijiaxing*, see Peng (1973). This hypothetical distribution matches closely the actual distribution of tanghao on tombstones, suggesting that to a large extent the tanghao derives from this literary source and not an individual family history. The individual family history, not of a migration, but of a historical reference to a tanghao, might

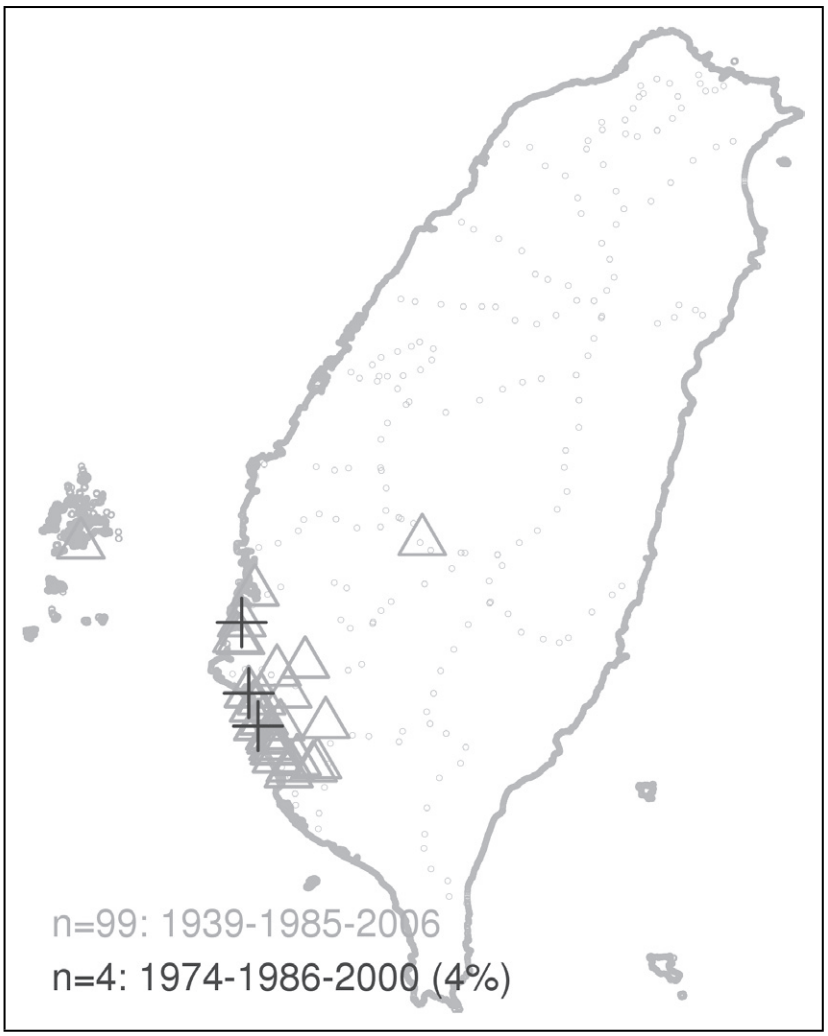


**Figure 29.** Transition from Taiwan to jiguan.

best be represented by the tanghao one finds at the ancestral halls of traditional houses. The correlation of the tombs with the ancestral houses, however, is less strong, than with the purely literary reference.

The lack of data, together with the local bias represents the main methodological problem of this study. 40.000 tombs are reduced with every processing step to obtain finally a few hundred networks. To improve the

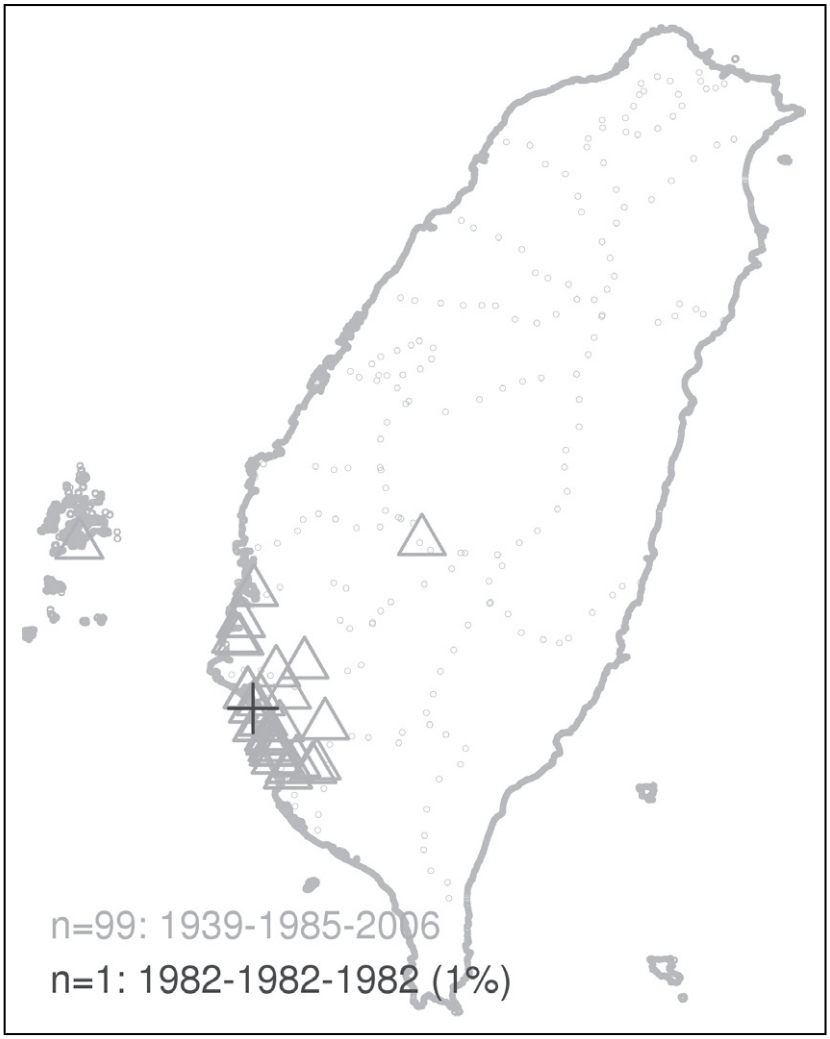


**Figure 30.** Transition from Taiwan to tanghao.

situation, small community graveyards, which usually represent a more densely connected network of tombstones, should be documented more intensively. In addition, opening this research up to other semantic roles in the focus would yield also more data and more changes in this position.

Finally, our research might, when appropriately redesigned, also applicable to regions that don't list mourners systematically. Other features that matching

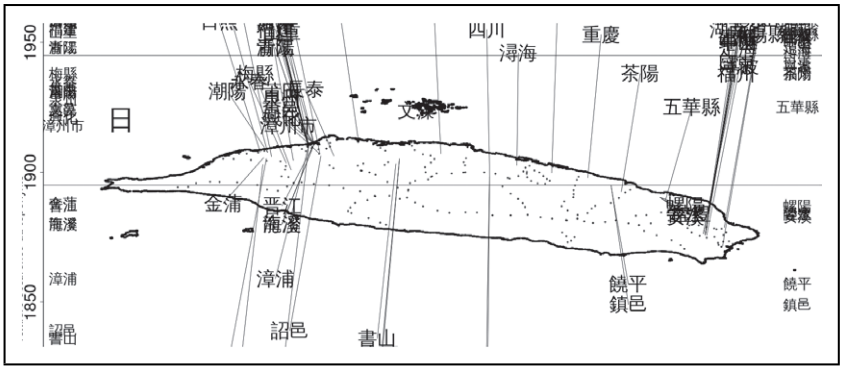


**Figure 31.** New tokens of the jiguan emerging during the Japanese colonial period. Many of them are not traditional and refer to larger areas in Fujian or Kuangtong.

names can trigger the linking of tombstones, such as the physical aggregation of tombs and tombstones in family tombs. It is further possible, to walk with families during the many regional tomb sweeping days, when they walk from family tomb to family tomb to perform their bei-bei ritual. Crowdsourcing might offer another solution to this problem, see Howe (2006), requiring an enhanced web-technologies and the establishment of social networks. We will try to draw the best out of all these approaches. The richness of the data we obtain, and the promises of a large-scale research on the conditions under which traditions change, we are sure, justify these efforts.

## END NOTES

[1] The name ThakBong is derived from the Taiwanese 讀墓 thak-bong, meaning *to study tombs*.

[2] In analogy, the left part, written from top to bottom, of tombstones that are written from left to right is also a focus position.

[3] We assume that at that time, the Japanese authorities were not fully knowledgeable about the interpretations of the tanghao. The Japanese census of 1901, for example, classified the Taiwanese according to their origin in Fujian and Guangdong, their jiguan. Yet, this census lists among the known Taiwanese jiguan also some tanghao, see Hsu (2013).

[4] Many Mainlander tombs don't mention the offspring, as especially soldiers and poor and wounded Mainlanders didn't have the chance to marry in Taiwan.

[5] Much of 19th and 20th century descriptive statistics is influenced by the need to estimate and approximate values in the absence of computational power. Today, this paradigm is no longer without alternatives. Within a few seconds, modern computers can repeat sampling experiments hundreds of times. After each sampling, drawing for example one boy and one girl from a population sample, the outcome is evaluated with respect to the research question, e.g. whether boys are taller than girls. The percentage of positive outcomes represents the probability estimate for the population. Thus, if in 90% of the samplings boys are taller, the probability that boys are taller than girls is estimated for this population as 90%. Probabilities

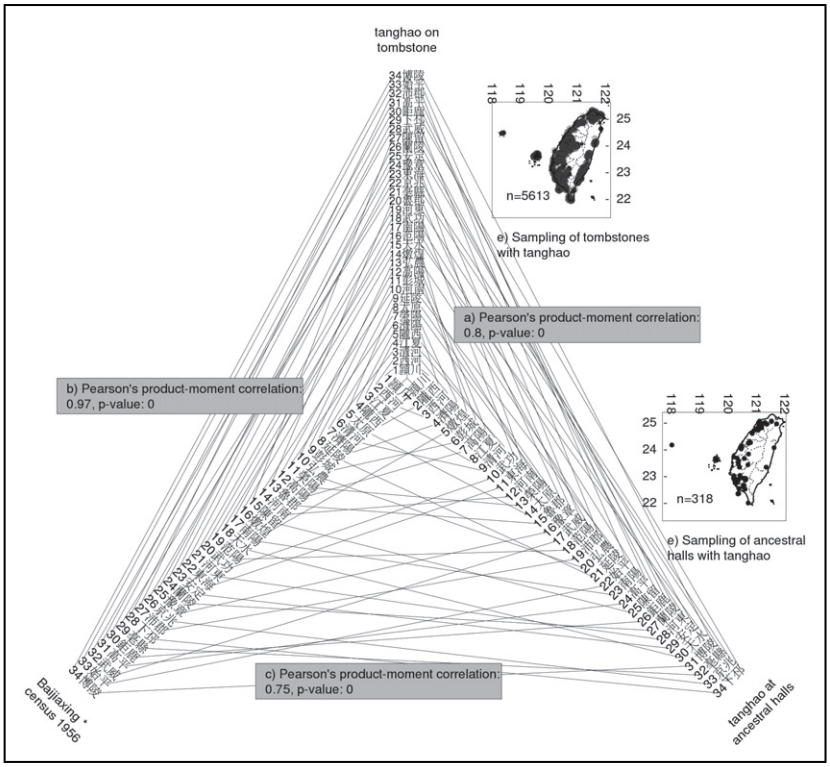


**Figure 32.** A comparison of the frequency of the tanghao on tombs, to those found above the entrance to the ancestral hall of traditional houses and to the hypothetical distribution, if the Taiwanese, with the surname distribution of 1956, see Streiter, Goudin, Huang and Lin (2011), would adopt a tanghao through the traditional Baijiaxing as listed in Gu and Ma (2005). The extreme high correlation of the tanghao on tombstones with this hypothetical distribution, suggests that the Baijiaxing and not individual family histories influenced the large majority of tanghao selected on tombstones.

under 95% are considered to be not reliable, as a consequence, the hypothesis that boys are taller is rejected. An introduction to resampling method is given in Good (1999).

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