Mapping Taiwanese ‘goose’

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The database for this study consists of responses from a thousand informants. The database can be queried for age, sex, education, language background, ethnicity, occupation, and residential history. The two common Taiwanese Southern Mĭn *goose* lexemes are *gô* and *giâ* (= Mandarin 鵝 *é*), accounting for 85% of all responses.

The vocalism of the *gô* lexeme can apparently wander around a very broad range of the back vowel space; I have noted eleven possible positions: [ɤ ~ ɤ̟ ~ o̞ ~ o ~ ɔ ~ o̟ ~ u̟ ~ u ~ u̟ ~ ɯ ~ ɔ], although just two variants—[goʌ] and [gɤʌ]—occur most frequently. [gɤʌ]- and [goʌ]-users contrast with respect to most background factors; and informants have the following characteristics depending on which form they use:

Factor	[gɤʌ]-users	[goʌ]-users	*Giâ*-users
Birthyear	1937	1931	1935
Sex	Slight female bias	Strong male bias	Neutral
Education	8 years	7 years (normal)	7 years (normal)
Stratum	Neutral	More Japanese lg. educ.	Slight Japanese ed.
Ethnic zone	Strongly Zhāngzhōu	Strongly Quánzhōu	Extremely Quánzhōu
Occupation	Slight business bias	Slight labor bias	Strong labor bias

A curious aspect of the vowel variation is the simplex vs. compound alternation in the same informant; e.g., the “paradigmatic” alternation [goʌ] ‘goose’ ~ [go˧˥.kɑŋ˥] ‘gander’ ~ [gɤ˧˥.bɤ˥] ‘she-goose’ (vowel harmony?).

From the query tables, we can trace the rise and fall of the rival variants [gɤʌ] and [goʌ] respectively, along with sociopolitical fashion. For example, the less frequent [ɤ] vocalism slowly increased in popularity earlier in the twentieth century, until after World War II, when the [ɤ] became the commoner form among younger Taiwanese, while it appears that [goʌ] is becoming extinct. It may well be the case that the relatively dramatic expansion of the unrounded vocalism [ɤ] at the expense of the rounded [o] has been influenced by the Mandarin *goose* word *é* [ɤʌ], in the aftermath of the linguistic tsunami of 1949.

Another issue taken up is the phenomenon of initial-*g* deletion in *gô* and *giâ*.

Factor	*Gô* > *ô*	*Giâ* > *iâ*
Birthyear	1959	1938
Sex	Parity	Strong female bias
Education	12 years (above normal)	6 years (below normal)
Stratum	Mandarinized	Neutral
Ethnic zone	Strongly Zhāngzhōu	Completely Quánzhōu
Occupation	Businessmen & students	Farmers & housewives

In the case of the *gô*-based, *g*-less forms in [ɔu̯ ~ ɔ ~ ɤ ~ ɤ̟~ o̞ ~ o ~ ʊ], the loss of initial /g/ is due to young, Mandarinized Taiwanese not pronouncing a voiced velar plosive because such a phoneme does not exist in standard Mandarin. But in the case of the *giâ*-based, *g*-less forms in [i̯ɑ], it seems less likely that Mandarin had much influence in this much earlier process.

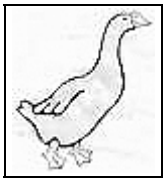
In an etymological excursus, I propose that proto-Indo-european *ǵʰans ‘goose’ is borrowed into proto-Chinese as *ɡans. But since there already was a native Chinese word for ‘goose’, i.e. *ŋai, the borrowed word was semantically narrowed to ‘wild goose’ and its initial was assimilated to *ŋ- under the synonymous influence of *ŋai, producing *ŋans. The original form of the borrowing, however, has been kept with extremely specialized meanings: *ɡans ‘exotic bird; feather’.

Key words: Taiwanese Southern Min, sociophonetic variation, linguistic profiling, goose

§1. **Introduction**.

In attempting to survey the various factors influencing the linguistic development of the *goose*-words in my database, it would be nice if the reader could

keep in mind some extra-linguistic facts, the vectors that have shaped the island's current linguistic situation; towards this end I begin with a thumbnail sketch of island history (§1.1) and its reflection in my database (§1.2). Following that is an outline of how I try to measure seven background factors for each informant: age, sex, education, language background, ethnicity, occupation, and residential history (§1.3). The results of querying the database have been arranged in appended tables and interpreted in the text.



Section 2 consists of a lexeme inventory of all the responses to the *goose* item of structured questionnaires, administered around the island by my students from 1992 through 2006. There are 1,137 responses from 1,018 informants. 1,051 of the responses are Southern Min (from 948 informants) and 86 are Hakka responses. (The illustration to the left is a reduction of the stylized picture prompt used during the interviews for this particular item.)[1]

Section 3 discusses several issues emanating from the *goose* project: the mystery of the missing initial /g/ (§3.1); the rise and fall of rival variants along with sociopolitical fashion (§3.2); and vowel alternation in the *goose* "paradigm" (§3.3).

In §4, I make my first foray into Chinese etymology, carrying the reconstruction of Taiwanese *gô* and *giâ* back to Old Chinese, making connections even farther afield.

§1.1. **External history of Táiwān**.

The complexity of the language situation on the island is a reflection of its external history, for which there are six distinct periods.[2]

(a) **Austronesian**. The oldest linguistic strata would be the Austronesian languages, now mostly confined to the mountains and the east coast, and in various degrees of endangerment.[3]

(b) **Dutch Commercial Period** (1624-1662). In their 38-year presence on the island, the Dutch East India Co. included Táiwān in its vast trading enterprise, stretching from Japan to the Cape of Good Hope in southern Africa. Their primary goal in Táiwān was organizing Chinese settlers for agricultural production. (Chinese presence on Táiwān is documented to the 12th c. AD.) Linguistically, no trace remains of the Dutch occupation.

(c) **Fall of the Míng Dynasty**. In 1644, the Manchus overthrew the Míng, resulting in chaos in southern China, aggravated by predation by Japanese pirates. As a result, 100,000 Chinese fled to Táiwān. The Zhèng family (Míng loyalists) acquired Dutch assets in 1661 and ran the island for twenty years.

(d) **Qīng Dynasty rule** (1683-1895). For 212 years, the Manchus claimed sovereignty over Táiwān. Migrations continued to the west coast, 82% from Fújiàn (Quánzhōu (Ānxī, Tóng'ān, Sānyì) & Zhāngzhōu), 13% from Guǎngdōng (Cháozhōu, Huìzhōu, Jiāyìng (Hakka)). Most Táiwan people now speak Mǐn dialects referred to as Xiàmén-type (aka "Hokkien"), from southern Fújiàn.

(e) **Japanese Industrial Period** (1895-1945). Chinese immigration was banned and Japanese migration encouraged. Japanese ultimately formed 5% of the

[1] An early study of *goose*-words in Táiwān can be found in Zhōng Lùshēng's unpublished atlas, item no.4, pp. 99-122. Âng Uî-jîn kindly provided me with a copy of this pioneering work not too long ago.
[2] Hsieh 1964, p.140ff.
[3] Cf. Li 2004, p.67ff.

overall population, 41% in Táiběi alone. A vigorous campaign to promulgate Japanese was generally very successful.

(f) **Nationalist Chinese Period** (1945-2000). In 1949, two million Mainland refugees crowded into Táiwān cities; mostly from Fújiàn, Guǎngdōng, Zhèjiāng, Jiāngsū, Shāndōng, and Héběi provinces. Thereafter, considerable effort went into eliminating all non-Mandarin language varieties from public life on the island.

Several million Mǐn speakers have also settled in Thailand, Malaysia, Singapore, and Indonesia. (Many of the Chinese expelled from Indochina in recent years were Mǐn.) Southeast Asian Chinese mostly speak Xiàmén-type dialects, except in Thailand, where Cháozhōu-speakers predominate.[4]

§1.2. **The database**.

Among the 1,200 Southern Mǐn informants in my database, with a mean birthyear of 1934, it is not unusual to find ordinary folks able to speak two, three, and sometimes even more different languages. For my purposes, I have sorted them into four categories according to language background: (a) 17% are monolingual Southern Mǐn speakers; (b) 8% are bilingual Southern Mǐn and Japanese speakers; (c) 34% are bilingual Southern Mǐn and Mandarin speakers; and (d) 41% claim to be trilingual. This state of affairs reflects the fact that throughout the past century Japanese and Mandarin were successive rival superstrata with which the other ethnic groups on the island have had to contend. Half my informants as a result claim some knowledge of Japanese, with three-quarters of them claiming knowledge of Mandarin Chinese.

§1.3. **Measuring Background Factors**.[5]

To analyze the responses, I have used three basic ways of measuring seven factors: The **residual** (ε) for age and education; the **comparandum** (κ) for gender, multilingualism, ethnicity, and occupation; and the **MapLoc evaluation** (*Mle*) for residential history. The following table defines the seven background factors.

Table τα: Summary of Informant Background Factors.

Factor	Abbrev.	Value	Explanation
φ_1	μ_{by}	1934	Mean birthyear, min. 1901, max. 1979
φ_2	μ_{ed}	7	Mean years of Education, min. 0, max. 23
φ_3	ρ_{sx}	1.1044	Gender ratio of 529 males / 479 females
φ_4	ρ_{st}	0.6623	Stratum ratio of 500 Japanese / 755 Mandarin Chin. (fyi 155 Hakka)
φ_5	ρ_{ez}	1.2961	Ethnic zone ratio of 499 Quánzhōu / 385 Zhāngzhōu (fyi 106 Hakka)
φ_6	ρ_{occ}		Any one of 14 occupation ratios:
$\varphi_{6.1}$	ρ_{agr}	0.2780	Agriculturalist ratio of 283 farmers/total of 1,018 infs.
$\varphi_{6.2}$	ρ_{hw}	0.1847	Housewife ratio of 188/1,018
$\varphi_{6.3}$	ρ_{bus}	0.1651	Business person ratio of 180/1,018
$\varphi_{6.4}$	ρ_{stu}	0.0654	Student ratio of 51/1,018
$\varphi_{6.5}$	ρ_{lab}	0.0619	Laborer ratio of 66/1,018
$\varphi_{6.6}$	ρ_{gov}	0.0619	Government worker ratio of 54/1,018
$\varphi_{6.7}$	ρ_{edu}	0.0482	Educator ratio of 46/1,018
$\varphi_{6.8}$	ρ_{relX}	0.0195	Christian religious worker ratio of 18/1,018

[4] Norman 1988, p.233 (§9.4 “The Mǐn dialects”).
[5] See Brewer (in press), §2, for details.

φ6.9	ρ_{medW}	0.0115	Western medical worker ratio of 12/1,018
φ6.10	ρ_{fis}	0.0069	Fisherman ratio of 7/1,018
φ6.11	ρ_{mil}	0.0046	Military personnel ratio of 6/1,018
φ6.12	ρ_{relT}	0.0046	Taoist religious worker ratio of 5/1,018
φ6.13	ρ_{medC}	0.0023	Herbalist ratio of 2/1,018
φ6.14	$\rho_{?}$	0.0929	Occupational information problematic ratio of 100/1,018

φ7	*Mle*	0 → 99	Map location evaluation, a percentage from Ø to 99

§1.3.1. Age and education: residual scales.

These two factors have proven the simplest to deal with, since calculations merely involve querying the database for a variable mean and then subtracting that figure from the norm, to obtain a positive or negative number, or a zero indicating an outcome at the norm.

Birthyear (φ1) residual scale:

Period:	I. 1901-1919					II. 1920-1933			III. '34-'39	IV. 1940-1954			V. 1955-1972				VI. 1973-1979	
Birthyear:	1895	1900	1905	1910	1915	1920	1925	1930	**1935**	1940	1945	1950	1955	1960	1965	1970	1975	1980
Differential:	-40	-35	-30	-25	-20	-15	-10	-5	**0**	+5	+10	+15	+20	+25	+30	+35	+40	+45
Descriptive:	Elderly						Oldish		Normal	Youngish			Youthful					

Education (φ2) residual scale:

Educational level:	Elementary (1-6)						Junior High (7-9)			Senior High (10-12)				College	
Years of Education:	0	1	2	3	4	5	6	7	8	9	10	11	12	13	…
Differential:	-7	-6	-5	-4	-3	-2	-1	**0**	+1	+2	+3	+4	+5	+6	…
Descriptive:	Below-average education						Average educational range			Above-average education					

§1.3.2. Sex, stratum, and ethnic zone: comparanda scales.

The idea behind the **comparandum** (**κ**) is that when two variables are in binary opposition it is possible to compare their ratio with a norm. This I have done for three of the background factors. The formula used to calculate a comparandum for these three factors is basically {100 * (the ratio of two related variables divided by their norm) – 100}. The result is either a positive or negative degree of variation from the norm (at zero), or zero, as schematized in the scale below:

-140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 **0** +10 +20 +30 +40 +50 +60 +70 +80 +90 +100 +120 +130 +140								
Extreme negative bias	Strong bias	Moderate bias	Slight bias	Normal	Slight bias	Moderate bias	Strong bias	Extreme positive bias

This scale then becomes the model for three of the individual factors.

Sex (φ3) comparandum scale:

-140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 **0** +10 +20 +30 +40 +50 +60 +70 +80 +90 +100 +120 +130 +140								
Extreme ♀ bias	Strong ♀ bias	Moderate ♀ bias	Slight ♀ bias	Normal ♂/♀	Slight ♂ bias	Moderate ♂ bias	Strong ♂ bias	Extreme ♂ bias

Stratum (φ4) comparandum scale:

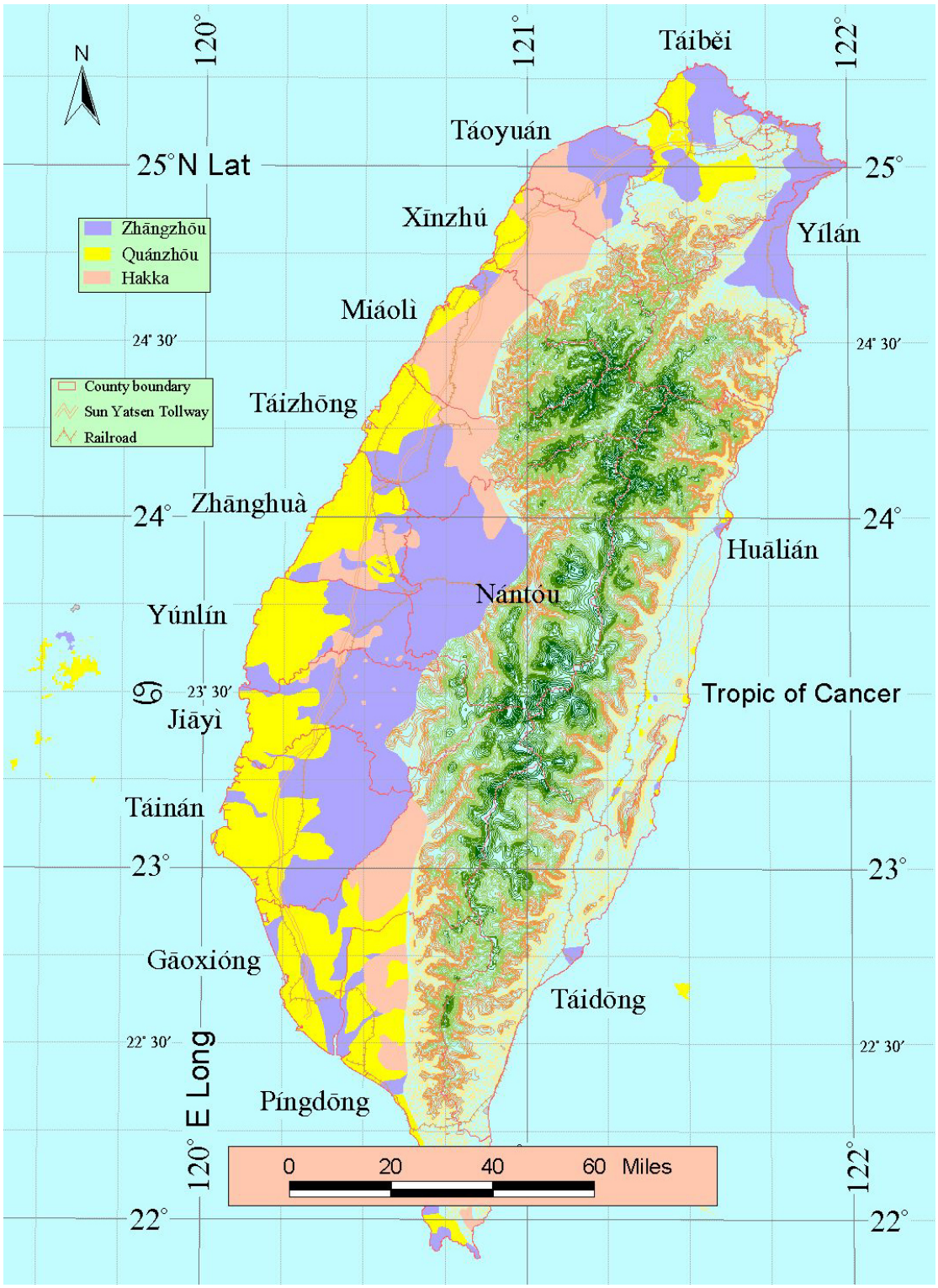
-140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 **0** +10 +20 +30 +40 +50 +60 +70 +80 +90 +100 +120 +130 +140								
Extreme Mandarin bias	Strong Mc bias	Moderate Mc bias	Slight Mc bias	Normal Jp/Mc	Slight Jp bias	Moderate Jp bias	Strong Jp bias	Extreme Japanese bias

Ethnic Zone (φ5) comparandum scale:

-140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 **0** +10 +20 +30 +40 +50 +60 +70 +80 +90 +100 +120 +130 +140								
Extreme Zhāngzhōu bias	Strong Z bias	Moderate Z bias	Slight Z bias	Normal Q/Z	Slight Q bias	Moderate Q bias	Strong Q bias	Extreme Quánzhōu bias

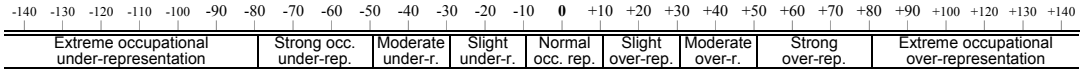
§1.3.2.1. Below is the base map on which I locate informants. It is essentially the digitization of an ethnic map in Ogawa 1907, which was based on nineteenth century genealogical records.

Traditional Chinese Ethnic Zones in Táiwān



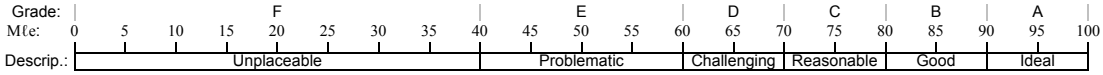
§1.3.3. Occupation (φ6) comparandum scale.

Because of the large number of occupational categories, the smaller variable subtotals for any given query makes the method used to derive the other three comparanda (κ_{sx}, κ_{st}, and κ_{ez}) impractical; the occupation comparandum (κ_{occ}) is consequently calculated a bit differently.[6]



§1.3.4. Map Location (φ7) Evaluation scale:

The MapLoc evaluation (*Mℓe*) is a method of evaluating the geographic background of an informant for placement on a linguistic map. The scale in this case runs from zero to 100, depending upon the reliability of the placement of an informant on a linguistic map of Táiwān. The A through F grades and the descriptive terms give



more user-friendly ways of considering the problem of dealing with residential history than the boiled-down raw scores.

§2. **Lexeme inventory.**

The *goose* collection consists of 1,137 responses from 1,018 informants. 1,051 of the responses are Southern Min (from 948 informants) and 86 are Hakka.

τβ	Lexeme	Resp.	Ser. no.	Table
§2.1	λ1 *Gô* ± *-á*	764	001-764	τ1, τ2
§2.1.1	λ1a [gɯ˨ ± ɑ˥]	32	001-032	"
§2.1.2	λ1b [gu̯˨]	3	033-035	"
§2.1.3	λ1c [gu˨ ± ɑ˥]	81	036-116	"
§2.1.4	λ1d [gu̯˨ ± ɑ˥]	9	117-125	"
§2.1.5	λ1e [go̯˨ ± ɑ˥]	39	126-164	"
§2.1.6	λ1f [gɤ˨ ± ɑ˥]	209	165-373	"
§2.1.7	λ1g [gɤ̯˨ ± ɑ˥]	18	374-391	"
§2.1.8	λ1h [go̯˨ ± ɑ˥]	35	392-426	"
§2.1.9	λ1i [go˨ ± ɑ˥]	298	427-724	"
§2.1.10	λ1j [gə˨ ± ɑ˥]	20	725-744	"
§2.1.11	λ1m [gɔ˨]	20	745-764	"
§2.2	λ2 *Giâ* ± *-á*	234	765-998	τ1, τ2, τ5, τ6
	λ2a [gi̯ɑ˨ ± ɑ˥]	217	765-981	"
	λ2b [i̯ɑ˨ ± ɑ˥]	17	982-998	"
§2.3	λ3 *É*	14	999-1012	τ1, τ2
§2.4	λ4 *Ah*	29	1013-1041	"
§2.5	λ5 Lexical gap	10	1042-1051	"
§2.6	λH1 *Ngô·*	72	H01-H72	τ7 & τ9
	λH2 *Ngô·-tsɨ*	14	H73-H86	"
§2.7	λJ1 *Gachô*	passim		

[6] Ibid. §2.2.4.

Taiwanese *gô* (鵝, MW *chiah*) has at least twenty phonetic variants, which altogether make up four-fifths of all TSM responses. It occurs three times as often as its nearest rival, its ultimately cognate colloquial form *giâ*. The remaining 6% of TSM responses is a mélange indicating a growing loss of the traditional *goose*-words. Many Taiwanese even cited Japanese *gachô*.[7] The smaller collection of strictly Hakka forms, by contrast, shows much less variety of response, invariably *ngô·* or *ngô·-tsi*.

Three-quarters of the 948 TSM informants responded with the three most frequently occurring *goose*-words: λ1f {209 responses}, λ1i {298}, and λ2 {234}. The numbers for these three are big enough to allow confidently drawn conclusions, summarized in the table below (based on query tables τ1 and τ2).

τγ	Ɛby	Ʞsx	Ɛed	Ʞst	Ʞez	Ʞoa	Ʞoh	Ʞob	Ʞol	Ʞog	Ʞoe	Ʞos	Ʞo?
λ1f [gɤɻ±ɑ˥]	+3	-15	+1	-15	+48	-2	-9	+22	-48	-1	+16	+34	-32
λ1i [goɻ±ɑ˥]	-3	+39	0	+24	-59	+5	-7	-3	+29	-11	-11	-40	+2
λ2 *Giâ±-á*	+1	-4	0	-12	+365	-1	+10	-24	+33	-11	+5	-31	+5

As I interpret this data, [gɤɻ]- and [goɻ]-users contrast with respect to most background factors; and, putting it in plain English, informants have the following characteristics depending on which form they use:

τδ	Factor	λ1f [gɤɻ]-users	λ1i [goɻ]-users	λ2 *Giâ*-users
φ1	Birthyear	1937	1931	1935
φ2	Sex	Slight female bias	Strong male bias	Neutral
φ3	Education	8 years	7 years (normal)	7 years (normal)
φ4	Stratum	Neutral	More Japanese lg. educ.	Slight Japanese
φ5	Ethnic zone	Strongly Zhāngzhōu	Strongly Quánzhōu	Extremely Quánzhōu
φ6	Occupation	Slight business bias	Slight labor bias	Strong labor bias

When giving multiple responses, laborers show a downright aversion to [gɤɻ]. And, incidentally, Hakka informants, when reporting Southern Min data, prefer rounded forms.

§2.1. **λ1 *Gô±-á*** {746 inf, 764 resp}, Mandarin 鵝 *é*.

The most frequent Taiwanese Southern Mĭn response for ‘goose’ is *gô*, in its various guises. Seventy-three percent of the 1,018 informants, in fact, responded with some form of *gô* or *gô-á*. As a result of its preponderance, λ1 characteristics for age, sex, education, stratum, and ethnicity run fairly close to the norm. There is, however, an overall slight Zhāngzhōu bias, due no doubt to an overwhelmingly Z-ish distribution in the north, in Táoyuán, Táiběi, and Yílán, as can be plainly seen on the map to the right. This gross, diaphonemic picture, however, conceals a subtler view discernible only through a close, detailed phonetic transcription.

[7] E.g., int.0295 [kɑɬ.tɕi̯o˥]; cf. Karlgren 1923, no.679, Sino-Japanese *ga*.

One of the main purposes of this exercise is to analyze vowel gradations in this particular word: its vocalism can apparently wander around a very broad range of the back vowel space: [ɤ ~ ɣ̞ ~ o̞ ~ o ~ o̞ ~ u̞ ~ u ~ u̟ ~ ɯ ~ ə]. This inventory attempts to ferret out any possible background factors related to this vocalic variation.

§2.1.1. **λ1a [gɯʌ]** {32}.

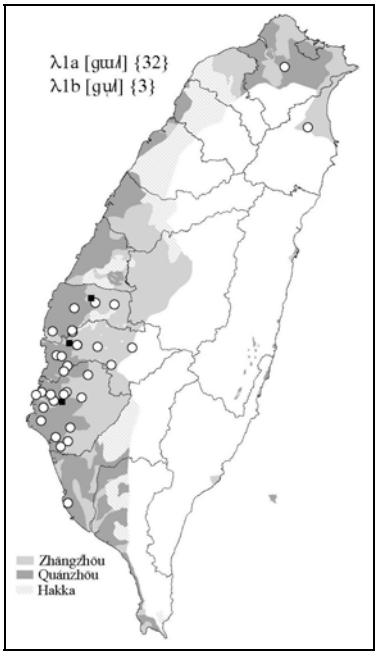
The map on the left below shows how the close back unrounded [ɯ] clusters mostly in western Jiāyì and Táinán counties, in Quánzhōu territory. The only other notable feature is a birthyear residual of -4; i.e., the informants are on average a bit older.

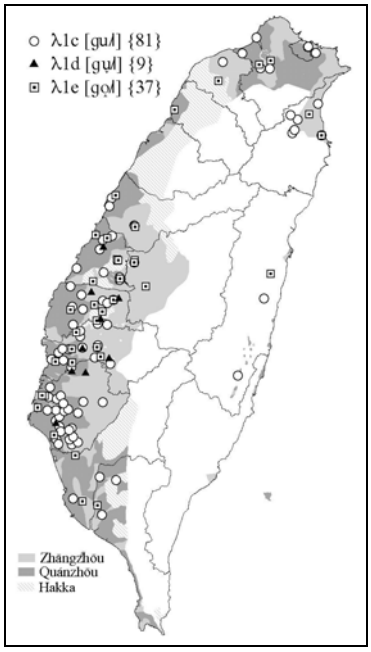
λ1a [gɯʌ]{14} Ints. <0020 0025 0164 0175 0196 0208 0330 0400 0461 0519 0588 0678 0741 0834>
λ1aa [gɯʌ.ɑ\]{18} Ints. <0425 0069 0223 0404 0527 0530 0577 0580 0603 0638 0643 0778 0786 0810 0823 0827 0864 0880>

§2.1.2. **λ1b [gu̟ʌ]** {3}.

With only three attestations in my data, the less rounded [u̟] is difficult to categorize. According to the background record, it might just as well have been lumped together with either [ɯ] or [u], indicating a roundedness transitional status.

λ1b [gu̟ʌ]{3} Ints <0220 0306 0856>





§2.1.3. **λ1c [guʌ±ɑ\]** {81}.[8]

This rounded variant is noteworthy for just about everything. It has a strong bias for older, less educated, male farmers. It may look Q-ish on the map, but is actually evenly distributed over Quán- and Zhāngzhōu.

λ1c [guʌ]{28} Ints <0002 0006 0015 0016 0027 0030 0038 0083 0105 0126 0224 0285 0302 0387 0388 0696 0719 0820 0821 0835 0857 0859 0860 0878 0914 0936 0965 1073>
λ1ca [guʌ.ɑ\]{53} Ints <0019 0033 0039 0095 0119 0132 0180 0199 0218 0230 0283 0321 0330 0353 0372 0396 0406 0410 0411 0413 0432 0436 0439 0457 0584 0637 0690 0699 0726 0728 0730 0747 0750 0776 0789 0798 0812 0816 0818 0844 0847 0863 0866 0874 0946 0977 1059 1062 1074 1079 1094 1220 1231>

[8] During transcription, one of my Taiwanese assistants vehemently disagreed with writing [guʌ] for 'goose', affirming that [guʌ] could only mean '牛, ox, water buffalo' (Southern Mîn *gû*): a clear instance of infelicitous homophony making someone very unhappy.

§2.1.4. **λ1d [gu̯ɻ±ɑ˥]** {9}.

The ethnically ambiguous [u̯]-variant is associated with older male farmers, among the least educated in the survey. It could just as well be merged upwards with [u] or downwards with [o̯], indicating vertical transition.

λ1d [gu̯ɻ] {3} Ints <0089 0946 1075>
λ1da [gu̯ɻ.ɑ˥] {6} Ints <0004 0170 0476 *0738* 0806 1083>

§2.1.5. **λ1e [go̯ɻ±ɑ˥]** {39}.

Used especially by very old male farmers, with a strong Japanese background; looks somewhat Q-ish on map μ7.

λ1e [go̯ɻ] {20} Ints <0017 0031 0041 0121 0126 0127 0180 0264 0275 0296 0512 0535 0590 0601 0683 0690 0775 0962 1230 1240>
λ1ea [go̯ɻ.ɑ˥] {19} Ints <0010 0022 0061 0096 0181 0183 0216 0299 0369 0401 0426 0437 0440 0456 0731 0773 0780 0896 1069>

§2.1.6. **λ1f [gɤɻ±ɑ˥]** {209}.

λ1f is one of the three heavyweights in the data, along with λ1i [goɻ±ɑ˥] and λ2 *Giâ±-á*; cf. §2 above. The [ɤ]-users are relatively youthful (μ_{by} 1938), with a slight female bias, coming mostly from Quánzhōu territory. Among the various occupations, only business people show a significant favoring of [ɤ].

λ1f [gɤɻ] {72} Ints <0009 0034 0035 0062 0067 0080 0088 0101 0102 0114 0115 0129 0158 0169 0179 0197 0202 0204 0209 0210 0215 0227 0274 0278 0284 0286 0327 0330 0338 0382 0408 0498 0572 0581 0583 0684 0688 0710 0724 0729 0746 0749 0751 0756 0785 0799 0815 0830 0832 0833 0850 0853 0861 0887 0941 0945 0952 0969 0988 1011 1013 1020 1034 1035 1036 1043 1044 1046 1056 1077 1098 1247>
λ1fa [gɤɻ.ɑ˥] {137} Ints <0007 0008 0011 0013 0014 0018 0021 0023 0026 0032 0036 0043 0054 0056 0063 0064 0065 0071 0073 0079 0103 0113 0117 0136 0151 0154 0163 0192 0193 0195 0203 0205 0213 0274 0280 0287 0289 0294 0326 0380 0391 0407 0409 0414 0415 0416 0424 0427 0428 0429 0433 0447 0477 0492 0508 0529 0579 0582 0585 0591 0642 0646 0652 0667 0676 0677 0704 0740 0774 0777 0779 0781 0783 0784 0787 0790 0794 0795 0796 0797 0801 0802 0803 0804 0808 0811 0813 0817 0819 0824 0828 0829 0831 0838 0839 0840 0842 0846 0848 0851 0852 0854 0855 0862 0865 0876 0877 0902 0903 0911 0957 0960 0966 0970 0971 0974 0975 0987 0990 0994 1004 1021 1023 1031 1063 1072 1076 1078 1080 1085 1090 1092 1099 1100 1104 1105 1227>

§2.1.7. **λ1g [gɣ̟ɻ±ɑ˥]** {18}.

Geographic distribution of this slightly rounded [ɣ̟] resembles λ1f [ɤ] & λ1h [o̯] more than λ1i [o]. Otherwise, it seems remarkably normal.

λ1g [gɣ̟ɻ] {14} Ints <0003 0024 0139 0325 0479 0495 0509 0542 0548 0681 0761 0837 0912 0951>
λ1ga [gɣ̟ɻ.ɑ˥] {4} Ints <0055 0301 0346 0483>

§2.1.8. **λ1h [go̯ɻ±ɑ˥]** {34}.

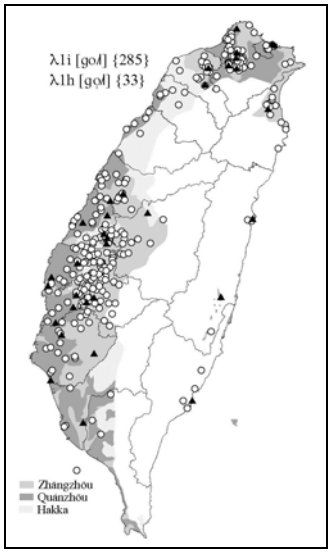
This scattering of [o̯] across map μ10 is strongly Z-ish.

λ1hØ [go̯ɻ] {19} Ints <0134 0138 0173 0211 0315 0419 0538 0694 0739 0767 0826 0916 0927 1026 1053 1066 1222 1237 1239>
λ1ha [go̯ɻ.ɑ˥] {15} Ints <0118 0166 0206 0312 0395 0489 0506 0616 0631 0657 0757 0793 0882 0918 1089>

§2.1.9. **λ1i [goɻ±ɑ˥]** {292}.

Twenty-nine percent of all 1,018 informants responded with λ1i, making it the commonest response in my collection. The respondents are a bit older (with a better Japanese background than Mandarin), with a goodly male bias, strongly rooted in Zhāngzhōu zones. Occupation-wise, only laborers show a good overrepresentation in the use of λ1i.

What look like diphthongs in λ1ib [gou̯ɻ] and λ1jd [gəu̯ɻ] (§2.1.10) may simply have been λ1iØ [goɻ] and λ1jØ [gəɻ] plus sentence-final particle [u˥]; however, λ1je [gəu̯ɻ.ɑ˩˧] does look like a real centralized diphthong. At any rate, the disparity in informant backgrounds would indicate a random phenomenon at best.



λ1iØ [goɻ] {152} Ints <0001 0004 0005 0010 0012 0028 0040 0042 0045 0047 0048 0051 0059 0070 0072 0094 0098 0101 0108 0109 0111 0124 0125 0128 0130 0131 0135 0137 0141 0156 0157 0161 0165 0171 0172 0174 0176 0185 0187 0188 0194 0200 0207 0208 0209 0221 0225 0226 0229 0246 0276 0277 0279 0288 0291 0304 0308 0311 0319 0331 0334 0336 0341 0350 0351 0360 0377 0383 0384 0386 0418 0420 0450 0453 0460 0464 0472 0486 0490 0499 0500 0501 0502 0523 0525 0528 0537 0540 0555 0558 0567 0568 0570 0573 0593 0595 0621 0626 0647 0654 0656 0659 0674 0675 0679 0682 0686 0692 0695 0701 0717 0722 0745 0759 0782 0809 0825 0849 0868 0879 0883 0893 0917 0921 0923 0925 0932 0937 0939 0950 0956 0958 0959 0964 0978 0983 0986 0999 1001 1006 1018 1038 1041 1048 1065 1070 1082 1087 1095 1228 1235 1248>
λ1ia [goɻ.ɑ˩˧] {140} Ints <0029 0044 0052 0053 0074 0075 0076 0077 0085 0097 0120 0133 0147 0150 0162 0167 0168 0177 0178 0182 0186 0191 0219 0222 0225 0248 0250 0253 0258 0272 0298 0303 0343 0358 0376 0378 0381 0419 0431 0434 0438 0441 0444 0446 0448 0449 0452 0455 0458 0459 0462 0463 0466 0467 0468 0469 0470 0473 0474 0475 0480 0481 0482 0505 0515 0520 0536 0544 0545 0550 0551 0552 0557 0560 0563 0564 0565 0576 0578 0627 0630 0639 0641 0645 0648 0669 0706 0707 0713 0714 0716 0727 0732 0734 0736 0737 0760 0762 0800 0807 0822 0836 0858 0867 0872 0885 0894 0913 0915 0919 0940 0948 0949 0955 0968 0973 0979 0991 0993 0995 1008 1027 1057 1067 1068 1081 1084 1096 1101 1221 1219 1223 1225 1232 1233 1243 1244 1251 1245 1227 >
λ1ib [gou̯ɻ] {1} Int <0661>

§2.1.10. **λ1j [gəɻ ± ɑ˩˧]** etc. {24}.

Those pronouncing *Gô* with a schwa are the youngest in the λ1 group with a mean birthyear of 1946, the best educated, and most Mandarinized; geographically diffuse. See §2.1.9 for comments on λ1jd & e.

λ1ja [gəɻ] {15} Ints <0290 0390 0504 0569 0615 0650 0660 0766 0814 0934 0947 0967 1003 1055 1097>
λ1jb [gəɻ.ɑ˩˧] {1} Int <0805>
λ1jc [gɜɻ] {2} Ints <0503 0511>
λ1jd [gəu̯ɻ] {4} Int <0340 0597 0733 0892>
λ1je [gəu̯ɻ.ɑ˩˧] {1} Int <0392>
λ1jf [əu̯ɻ] {1} Int <1014>

§2.1.11. **λ1m *Gô·*** {19}, *Ngô·* {9}.

λ1m is a mélange of forms with initial [g], [ŋ],[9] or zero plus [ɔ]. The probable development was [ŋɔ] → [gɔ] → [ɔ]: the reading form [ŋɔ] was blended with [go] to produce [gɔ], which then underwent initial-*g* deletion to beget [ɔ].

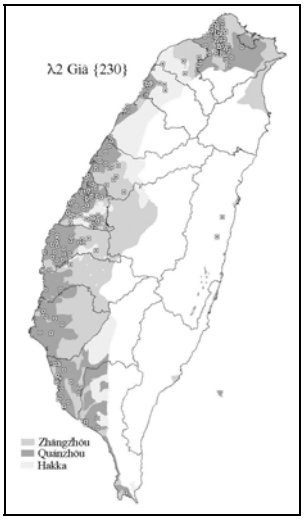
λ1ma [gɔɻ] {12} Ints <0050 0247 0253 0324 0354 0494 0513 0532 0586 0596 0623 0693>
λ1mb [gɔ̰ɻ] {1} Int <0123>
λ1mc [ᵑgɔɻ] {3} Ints <0721 0930 1032>
λ1mg [ɔɻ] {3} Ints <0742 0920 0992> (Cf. int.0768 [ʔɔ˩˧] Yúnnán Mandarin; *HFZ* & *HFC* maps.)
Cf. forms with initial [ŋ]:
λ1md [ŋɔɻ] {6} Ints <0237 0245 0493 0818 1025 1037>
λ1me [ŋɔ̃ɻ] {2} Ints <0720 0976>
λ1mf [ŋɔ̰ɻ] {1} Int <1245>

§2.2. **λ2 *Giâ* ± *-á*** {234}; τ5, τ6.

The most salient characteristic of this lexeme, the second most popular *goose*-word in the survey, is its off-the-scale Q-ishness. A mere glance at the map below leaves little doubt about its ethnic affiliation. As is the case for [goɻ], λ2 is overrepresented among laborers. See §3.1.1 for discussion of [gi̯ɑ] ~ [i̯ɑ].

[9] Cf. Xiàmén *Ngô·* [ŋɔɻ] in Douglas 110a, Barclay 50; Branner 2000, p.360 & p.401, note 270.

The strange back open-mid vowel of λ2f [gi̯ɔ˨], on the other hand, is no doubt a blend of [gi̯ɑ] and λ1ma [gɔ˨].



λ2a [gi̯ɑ˨] {205} Ints < 0002 0003 0006 0015 0016 0021 0025 0027 0031 0034 0037 0054 0058 0059 0060 0067 0068 0086 0088 0089 0090 0091 0092 0093 0094 0095 0098 0099 0100 0103 0104 0105 0107 0108 0111 0112 0130 0139 0140 0142 0143 0144 0145 0146 0148 0149 0150 0153 0155 0157 0158 0159 0160 0173 0179 0190 0191 0192 0193 0194 0198 0201 0210 0212 0213 0214 0215 0217 0223 0225 0228 0234 0250 0264 0271 0273 0274 0291 0295 0300 0309 0310 0317 0322 0325 0327 0329 0332 0339 0341 0342 0347 0348 0355 0356 0364 0367 0368 0375 0383 0386 0388 0389 0393 0425 0483 0484 0485 0487 0491 0496 0497 0499 0501 0502 0507 0513 0520 0525 0526 0531 0534 0537 0539 0546 0553 0556 0571 0573 0574 0575 0589 0592 0618 0625 0632 0634 0639 0644 0653 0659 0663 0666 0668 0680 0685 0691 0694 0695 0700 0705 0715 0718 0722 0723 0725 0735 0740 0741 0743 0745 0749 0751 0752 0753 0754 0755 0773 0874 0883 0884 0906 0907 0909 0910 0913 0924 0929 0935 0938 0943 0961 0963 0981 0984 0985 0997 0998 1002 1017 1024 1035 1042 1053 1054 1068 1071 1086 1091 1093 1102 1219 1236 1238 1226>
λ2b [gi̯ɑ˨.ɑ˥] {11} Ints < 0066 0116 0138 0147 0224 0510 0631 0748 0873 0882 0932>
λ2c [gi̯ɑʔ˨] {1} Int <0513>
λ2d [i̯ɑ˨] {11} Int <0266 0268 0270 0379 0636 0687 0870 0886 0953 1022 1226>
λ2e [i̯ɑ˨.ɑ˥] {6} Ints <0267 0931 0980 1028 1107 1229>
λ2f [gi̯ɔ˨] {1} Int <0996>

§2.3. **λ3 *É*** {12}.

Users of λ3 have a mean birthyear of 1969—twenty-nine years younger than the norm—and nearly double the years of education. The occupational gaps for λ3 on table τ2 indicate a restriction to the categories of student, business person, and housewife—no farmers, no laborers. The background characteristics for λ3 and λ5 (lexical gap) match so well, that they might well have been lumped together.

See §3 for discussion of [gɤ] ~ [ɤ].

λ3a [ɤ˨] {4} Ints <1033 1037 1045 1047>
λ3b [ɤ˨.ɑ˥] {4} Ints <0082 0365 0514 0518>
λ3c [ɤ̯˨] {1} Int <1016>
λ3d [o̯˨.ɑ˥] {1} Int <0496>
λ3e [o˨.ɑ˥] {1} Int <0900>
λ3f [ʊ˨] {1} Int <0635>

§2.4. **λ4 *Ah*** {29} [ɑʔ˩, ɑp˩] 鴨 (orig. “duck”).

I did not transcribe this response, since I considered it an error indicating a lexical gap. I wondered how an informant could confuse ‘goose’ and ‘duck’. One might have concluded that these people were young and urbanized, but the fact is the mean birthyear for this small group is 1931, three years older than the norm. My thinking changed in November 2000 when a student told me that her grandmother always referred to goose meat as [ɑ˥.bɑʔ˩] (Douglas 2a *ah-pa* ‘dried duck’). It then dawned on me that for some Taiwanese *ah* means ‘goose or duck’: it simply has an extended semantic range.

Though the numbers are a bit thin, table τ1 seems to indicate strong female and Quánzhōu biases.

λ4 *Ah* {29} Ints <0106 0110 0122 0249 0262 0316 0318 0320 0333 0337 0349 0357 0361 0373 0374 0522 0617 0620 0628 0640 0649 0665 0758 0881 1015 1088 1226 1242 1058>

§2.5. **λ5 Lexical gap** {10}.

Mean birthyear is 1968, absolutely the youngest set in the data, mostly students, 34 years younger than the norm; with the highest level of education (14 years); totally Mandarinized; geographically diffuse.

λ5 Gap {10} Ints <0046 0049 0152 1005 1012 1019 1029 1030 1039 1040>

§2.6. Hakka 'goose', λH *Ngô* ± *-tsɨ* {ct 86: ser H01-H86}; τ7 & τ9.

The following summary (based on query tables τ7 and τ9) indicates the background characteristics of the eighty-six Hakka informants and their fairly uniform responses, all of which begin with [ŋ].

	ε_{by}	κ_{sx}	ε_{ed}	κ_{st}	κ_{ez}	κ_{oa}	κ_{oh}	κ_{ob}	κ_{ol}	κ_{og}	κ_{oe}	κ_{os}	$\kappa_{o?}$
λH	**-1**	**-43**	**Ø**	**-9**	-14	-25	+39	+25	+8	+32	-49	-54	-92
λH1	**Ø**	**-49**	**Ø**	**-20**	-57	-33	+66	+10	+29	+31	-39	-45	-92
λH2	**-5**	-9	+1	+68		+29		+102		+35			-93

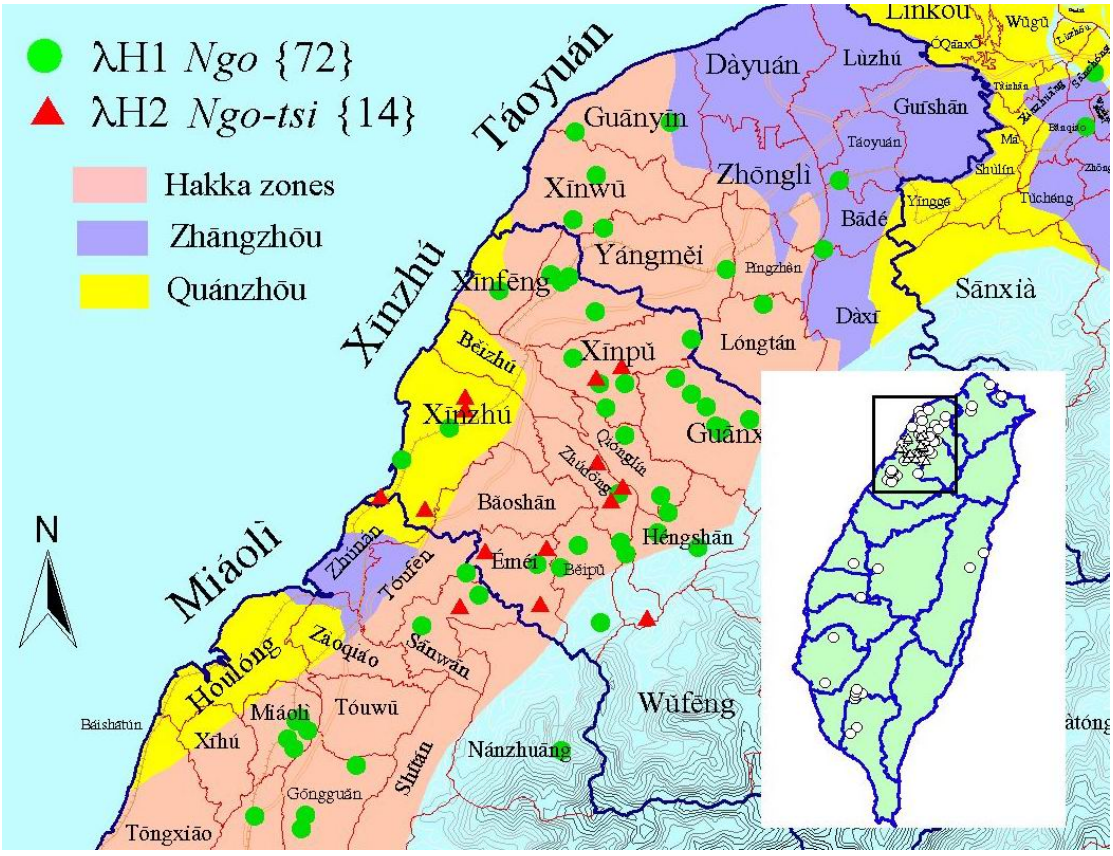
This is how I would read this table. For the Hakkaphones, average age and education are normal, but in contrast to the fairly even distribution of males to females in the overall collection (52% ♂ : 47% ♀), the Hakka sample has a strong female bias (38% ♂ : 62% ♀, κ_{sx} = -43); not surprisingly, housewives have a strong presence. Businessmen are slightly above normal, while farmers are underrepresented.

λH1 *Ngô* contrasts with λH2 *Ngô-tsɨ* in several respects. λH2 is found almost exclusively in the Hăilù Hakka zone of Xīnzhú County. λH2 users are six years older than λH1 users (and consequently have a stronger Japanese background). λH2 lacks the strong female bias of λH1.

Variations of λH *Ngô* ± *-tsɨ* {86} tabulated in τ7 & τ9 : [ŋɔ]{72}, [ŋo]{14}, [˥]^{55}{53} (Hăilù), [˧]^{33}{12}, [˨]^{13}{15} (TSM influence?), [˥]^{53}{6}. λH2 *Ngô-tsɨ*{14}: [-tsɨ]{10}, [-tsɯ]{4}

λH1 *Ngô* {72} Ints <0187 0232 0233 0234 0235 0236 0237 0238 0242 0243 0244 0245 0247 0253 0257 0261 0263 0266 0292 0293 0297 0305 0323 0328 0335 0352 0359 0362 0363 0366 0370 0371 0385 0488 0493 0524 0549 0554 0559 0566 0587 0622 0624 0662 0672 0697 0703 0709 0711 0712 0720 0769 0818 0871 0875 0890 0891 0898 0901 0905 0926 0928 0930 0942 0944 0972 0976 0982 0989 1025 1037 1245>

λH2 *Ngô-tsɨ* {14} Ints <0248 0250 0251 0252 0255 0256 0258 0259 0260 0265 0267 0268 0269 0270>



§3. **Inventory notes**.

The following subsections describe several ideas based on analyses of the inventory items. (1) The mystery of the missing-*g* involves a similar change taking place in two completely different settings. (2) Rival variants rise and fall with sociopolitical fashion. (3) Multiple choice of vocalism is not so simple as you think.

§3.1. **Initial-*g* deletion**.

Thirty-three informants responded with *gô*- and *giâ*-based forms lacking an expected initial /g/. The following summary table is based on query tables τ11 & τ12; I have separated the reading forms (*gô*-based) from the colloquial (*giâ*-based) since they seem to be starkly contrastive.

τε	Ɛby	Κsx	Ɛed	Κst	Κez	Κoa	Κoh	Κob	Κol	Κog	Κos	ΚomW	Κo?
Missing initial *g*	+14	-41	+2	-37	+12	7	6	5	1	1	9	1	3
Gô-based forms	+25	-10	+5	-60	-66		2	4		1	7	1	1
Giâ-based forms	+4	-62	-1	+1	+363	7	4	1	1		2		2

The numbers being somewhat meager, any conclusions regarding the *g*-less phenomenon should be taken *magnō cum granō salis*. Nevertheless, here they are.

τζ	Factor	*Gô*-base users	*Giâ*-base users
φ1	Birthyear	1959	1938
φ2	Sex	Parity	Strong female bias
φ3	Education	12 years (above normal)	6 years (below normal)
φ4	Stratum	Mandarinized	Neutral
φ5	Ethnic zone	Strongly Zhāngzhōu	Completely Quánzhōu
φ6	Occupation	Businessmen & students	Farmers & housewives

Actually, this pattern resembles the background characteristics for the better-attested counterparts with initial /g/, which is reässuring considering the minuscule sample under consideration. It is reasonable to assume that the loss of an initial /g/ in these cases would have been due to young, Mandarinized Taiwanese not pronouncing a voiced velar plosive because such a phoneme does not exist in Mandarin. This is clearly the case with the *gô*-based forms in [əu̯ ~ ɔ ~ ɤ ~ ɤ̰~ o̰ ~ o ~ ʊ]. (Users of [əu̯] or [ɤ], incidentally are much younger than users of rounded forms [o] or [ɔ].)

As for the *giâ*-based forms in [i̯ɑ], it seems less likely that Mandarin had much influence in the process.

§3.1.1. [gi̯ɑ] → [i̯ɑ].

As already noted, there is a clear distinction between *Iâ* ± *-á* users and just about everyone else in this group: they are closer to the norm in being older and less well educated; they are also mostly from Quánzhōu areas, and tend to be farmers and housewives. This loss of initial /g/ is, therefore, considerably earlier, and from an entirely different population sample, than is the case with /g/-loss in the *gô*-based forms.[10] With no outside factor at hand, [gi̯ɑ] → [i̯ɑ] may have been a simple phonological change: lenition due to ease of articulation.

[10] One would, therefore, think that this population sample would not be susceptible to a formal influence from Mandarin *yāzi* 鴨子 ‘duck’; *goose* and *duck* words are sporadically confused in Taiwan and elsewhere. Offhand, I am reminded of two other items in my survey, *giâ-kang* ‘centipede’ and

§3.1.2. [gɤ] → [ɤ].

There are two ways of looking at the eight responses with [ɤ]: ①Direct borrowing from Mandarin into Taiwanese, i.e., M *é* [ɤˊ] → TSM [ɤˊ]; or ②TSM initial-*g* deletion, since Mandarin has no phonemic voiced velar plosive, i.e., M */g/ ⇒ TSM [gɤˊ] → [ɤˊ]).[11] Which solution is applicable to any particular informant is obfuscated by the fact that either one coïncidentally yields a homophonous [ɤˊ].

§3.1.3. [ŋɔ] → [ɔ].

Assuming that the three instances of [ɔ*l*] are due to initial-deletion of [ŋɔ*l*], we have here a related phenomenon due to standard Mandarin's lack of initial /ŋ/. Yet keeping in mind that I have [gɔ*l*] in my collection (a blend of *ngô·* and *gô*), we cannot rule out a development [ŋɔ] → [gɔ]→ [ɔ], where the blend itself has fallen victim to initial-g deletion.

Gô-based forms:
λ1jf [ɔu̯*l*] {1} Int <1014>
λ1mg [ɔ*l*] {3} Ints <0742 0920 0992>
λ3a [ɤ*l*] {4} Ints <1033 1037 1045 1047>
λ3b [ɤ*l*.aꟾ] {4} Ints <0082 0365 0514 0518>
λ3c [ɤ̟*l*] {1} Int <1016>
λ3d [ɤ̝*l*.aꟾ] {1} Int <0496>
λ3e [o*l*.aꟾ] {1} Int <0900>
λ3f [ʊ*l*] {1} Int <0635>
Giâ-based forms:
λ2iØ [i̯a*l*] {11} Int <0266 0268 0270 0379 0636 0687 0870 0886 0953 1022 1226>
λ2ia [i̯a*l*.aꟾ] {6} Ints <0267 0931 0980 1028 1107 1229>

§3.2. **Chronological trends**.

The mean birthyear for the total *goose* sample is 1934, with a range of 1901-1979. Arranging all the various responses chronologically by mean birthyear yields the following: [gɤ̝*l*] 1924 > [gu*l*] 1927 > [gu̟*l*] 1928 > [gɯ*l*] 1930, [go*l*] 1930, *Ah* 1930 > [gɤ̟*l*] 1934, *Giâ* 1934 > [gɤ̝*l*] 1936 > [gɤ*l*] 1938 > [gu̟*l*] 1942 > [gɔ*l*] 1944 > [gə*l*] 1945 > *É* 1963 > Gap 1968.

Note that the [ɤ] set on average is six years younger than the [o] set: λ1f [gɤ*l*] 1937 vs. λ1i [go*l*] 1931. The [ə] set is youngest (1945) and best educated. [u]-users tend to be elderly (1927), male farmers. Casual inspection of this chain of dates brings to mind links to actual modern events in the island's history.

Tables τη and τθ and the five accompanying maps are an attempt to detect more precisely lexical trends in the data.[12] While the maps are not directly comparable because of the unevenness in the number of sites represented, still they can give an impression of the trends.

The first map, for age group (i), looks so neat on the west coast, with three complementarily distributed clusters of [gɤ*l*], [go*l*], and [gi̯a*l*]. Perhaps this reflects where the forms first got their foothold on the island. The map for age group (ii) looks

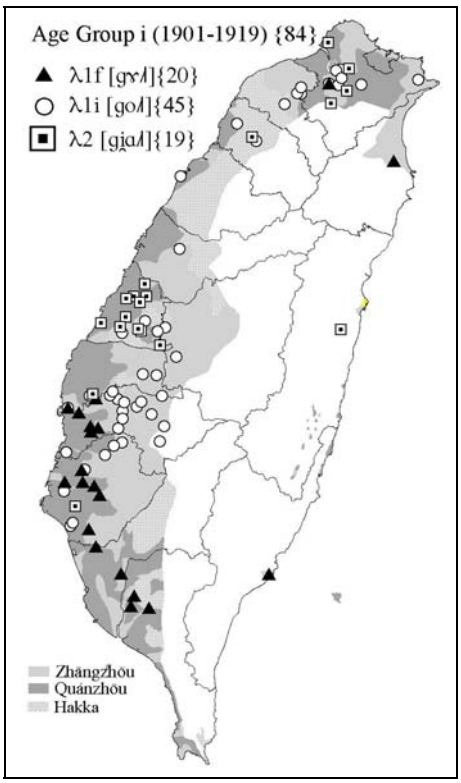
---

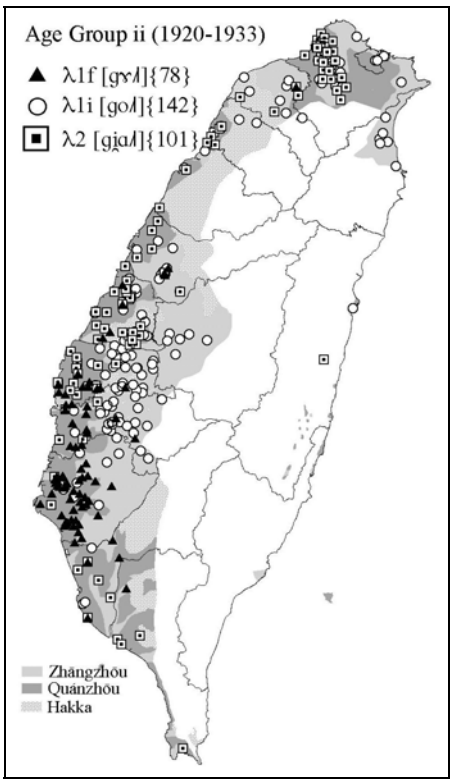
lâ-giâ 'spider'. The *centipede* word may have undergone the same process as *goose*: [gi̯a˧.kaŋ˥] ~ [i̯a˧.kaŋ˥]. *Spider*, on the other hand—aptly called a 'tarantula-like spider' in Douglas 1873, p.107a—where the /g/ is intervocalic, shows an intermediary stage with lenition: [g] → [ɣ] → [Ø]: [la˧.gi̯a*l*] ~ [la˧.ɣi̯a*l*] ~ [la˧.i̯a*l*].

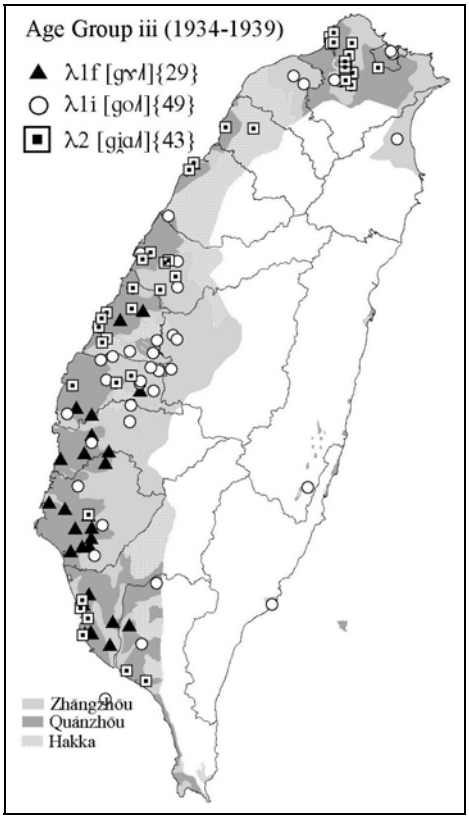
[11] Cf. Lien (2005), p.219.

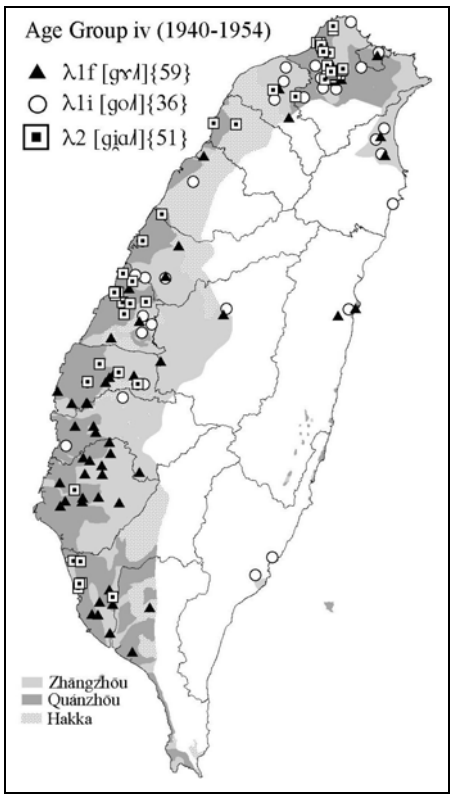
[12] See Brewer (in press) §2.2.2 for the rationale of the six age groups.

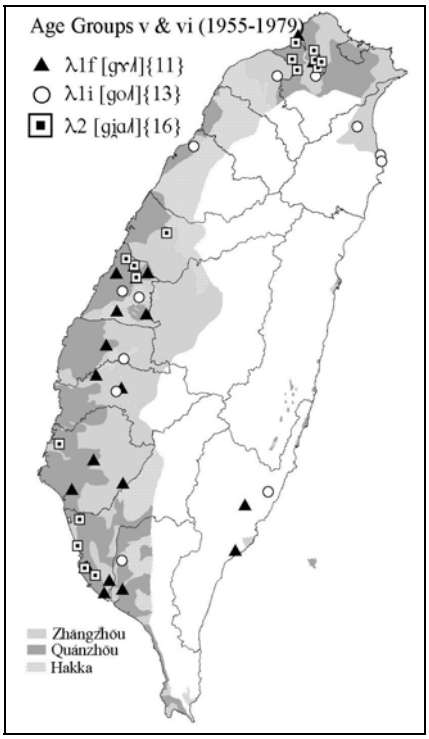
like a better-fed map (i); the three contenders are sprawled out and overlapping in every direction. The map for age group (iii) seems to be a continuation of the situation in the first two maps, so that we can safely say that for informants with mean











birthyears between 1901 and 1939, the distribution of the three main *goose*-words had been very stable.

§3.2.1. In table τη, the two commonest *goose* words, *Gô* and *Giâ*, are compared, showing that the relative popularity of the two has remained steady over the years, roughly at around three-to-one.[13] *Giâ* seems to be expanding ever so gradually over *gô*.

§3.2.2. Table τθ compares the two most common variants of *Gô* with unrounded [ɤ] and rounded [o]. Overall, the [o] forms outweigh the [ɤ] forms by 4 to 3. But, by breaking the data down into age classes, we can see a trend developing among younger informants.
The [ɤ] forms slowly increased in popularity earlier in the twentieth century, until after World War II, when the ratio was reversed and [ɤ] became the commoner form. It may well be the case that the relatively dramatic expansion of the unrounded vocalism [ɤ] at the expense of the rounded [o] has been influenced by the Mandarin *goose* word *é* [ɤ˧], in the aftermath of the linguistic tsunami of 1949.

Table τη: Usage of λ1 *Gô* ± *-á* vs. λ2 *Giâ* ± *-á*, by age class.

τη			1901-1919		1920-1933		1934-1939		1940-1954		1955-1972		1973-1979	
	n	λ/894	i	i/119	ii	ii/387	iii	iii/143	iv	iv/170	v	v/35	vi	vi/40
Norms:	**894**	(100%)	**119**	(100%)	**387**	(100%)	**143**	(100%)	**170**	(100%)	**35**	(100%)	**40**	(100%)
λ1 *Gô* ± *-á*	**706**	79%	101	88%	313	81%	116	81%	130	76%	23	66%	23	57%
λ2 *Giâ* ± *-á*	**225**	25%	19	16%	102	26%	40	28%	49	29%	9	26%	6	15%
λ1 : λ2	**3**.14 **: 1**		5.32 : 1 →		3.07 : 1 →		2.9 : 1 →		2.65 : 1 →		2.6 : 1 →		3.83 : 1	

Table τθ: Usage of λ1f [gɤ˨ ± ɑ˥] vs. λ1i [go˨ ± ɑ˥], by age class.

τθ			1901-1919		1920-1933		1934-1939		1940-1954		1955-1972		1973-1979	
	n	λ/894	i	i/119	ii	ii/387	iii	iii/143	iv	iv/170	v	v/35	vi	vi/40
Norms:	**894**	(100%)	**119**	(100%)	**387**	(100%)	**143**	(100%)	**170**	(100%)	**35**	(100%)	**40**	(100%)
λ1f [gɤ˨ ± ɑ˥]	**201**	22%	19	16%	76	20%	29	20%	57	33%	9	26%	11	27%
λ1i [go˨ ± ɑ˥]	**268**	30%	41	34%	136	35%	46	32%	33	19%	5	14%	7	17%
λ1f : λ1i	**.75 : 1**		.46 : 1 →		.56 : 1 →		.63 : 1 →		1.73 : 1 →		1.8 : 1 →		1.57 : 1	

§3.3. **Simplex and compound alternation**.

Taiwanese seem to revel in proffering variation. The following is a hodgepodge listing some sort of vowel alternation among closely related forms.

[13] Adding up the percentages of λ1 and λ2 for any given period will result in greater than 100% due to multiple responses.

(1) [ɯ ~ o]: [gɯ˨] ~ [go˦.kaŋ˥] ‘gander’, [go˦.bu˦] ‘she-goose’ <0208>.
(2) [ɯ ~ ɤ]: [gɯ˨.a˦˩] ~ [gu˨.a˥.kia̯˦˩] ‘gosling’ <0810>.
(3) [u ~ ɯ ~ ɤ]: [gɯ˨] ~ [gɤ˦.kaŋ˥], [gɤ˦.bɤ˦˩] ~ [gu˨.a˥.kiã˦˩] <0175>
(4) [u ~ o]: [gu˨.a˦˩] ~ [go˦.kak˦˩] <0413>
(5) [o̤ ~ o]: [go̤˨.a˦˩] ~ [go˦.du̯˥.la˦˩.] *gô-thûn-á* ‘adolescent goose’ <0181>
(6) [o̤ ~ ɯ]: [go̤˨.a˦˩] ~ [gɯ˨.a˥.kia̯˦˩] <0773>
(7) [ɤ ~ o ~ o̤]: [gɤ˨] ~ [go˦.kaŋ˥] ~ [go̤˦.bɤ˦˩] <0114>
(8) [ɤ ~ o ~ ɤ]: [gɤ˨] ~ [go˦.kaŋ˥] ~ [gɤ˦.bɤ˦˩] <0209>
(9) [ɤ ~ u]: [gɤ˨.a˦˩] ~ [gu˨.a˥.kia̯˦˩] <0862>
(10) [ɯ ~ o]: [gɯ˨] ~ [go˦.kaŋ˥], [go˦.bu˦˩] <0208>
(11) [o ~ o ~ ɤ]: [go˨] ~ [go˦.kaŋ˥] ~ [gɤ˦.bɤ˦˩] <0209>
Giâ simplex ~ *gô* compound:
(12) [i̯a ~ u]: [gi̯a˨] ~ [gu˨.a˥.kia̯˦˩] <0388>
(13) [i̯a ~ ɯ]: [gi̯a˨] ~ [gɯ˨.a˥.kia̯˦˩] <0773>
Gô simplex ~ *giâ* compound <Cf. also <0111 0191 0192 0194 0059 0139 0150 etc.>
(14) [o̤ ~ i̯a]: [go̤˨] ~ [i̯a˨] in cpds. <0264>

It looks like these people are assembling their “paradigms” from disparate sources. Several patterns (nos. 7, 8, 11) actually resemble vowel harmony.

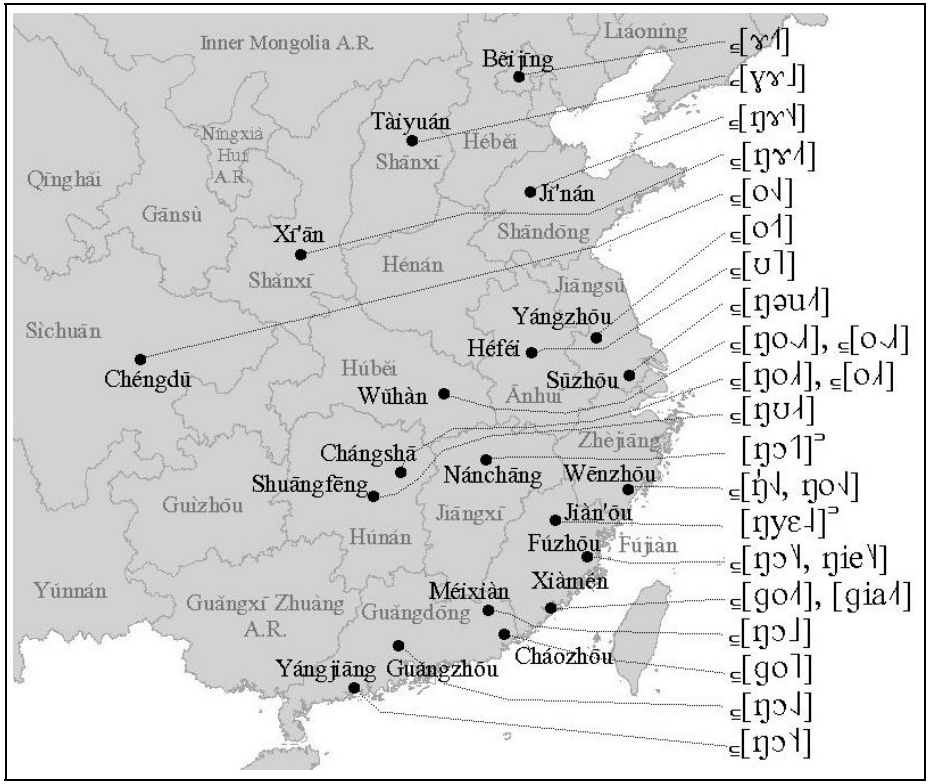
§3.4. **Mainland connections**.

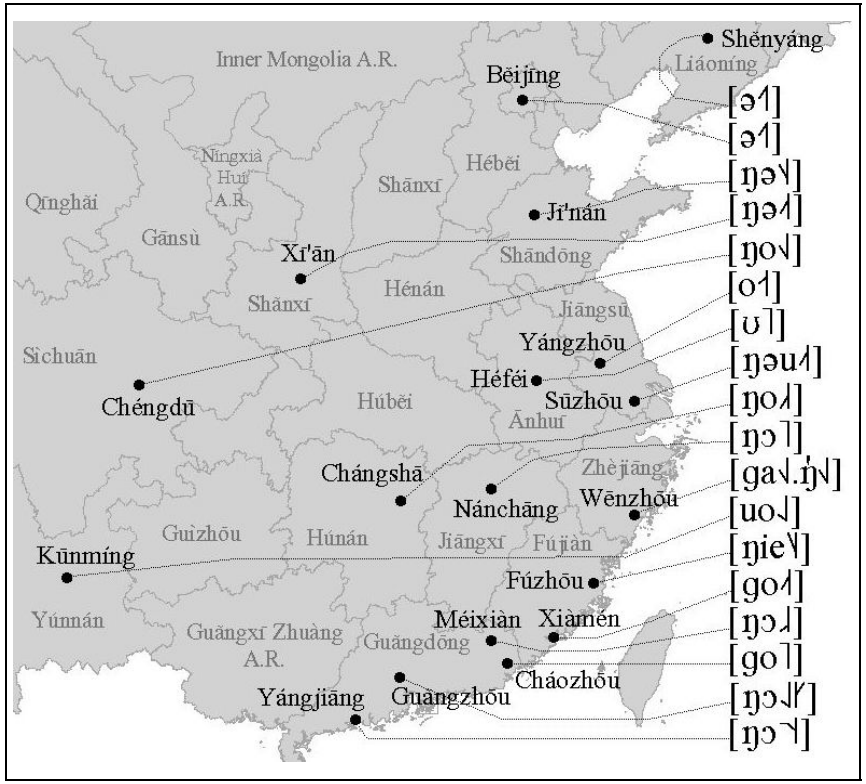
Across the Táiwān Strait is another world of *goose* forms.

Fāngyán Group	Subgroup	MapLoc	鵝
Eastern Mǐn	Northeastern Mǐn, Fúníng	Fú’ān Shì	[ŋɛ˩]²
	Northeastern Mǐn, Hóuguān	Fúzhōu Shì	[ŋie˩˧]²
	Southern Mǐn, QuánZhāng	Xiàmén Shì	[gia˨˦]²
	Southern Mǐn, Cháoshàn	Cháozhōu Shì	[go˥]²
Western Mǐn	Northwestern Mǐn	Jiàn’ōu Xiàn	[ŋyɛ˦]⁵
	"	Jiànyáng Xiàn	[ŋye˦]²
	Far Western Mǐn, Shàojiàng	Shàowǔ Shì	[ŋo˦]²

The seven forms listed in the table above and plotted on the map of Mǐn data from Fújiàn and Guǎngdōng provinces are from Norman 1991, p.208. The two maps on the following page are based on table τ13 in the appendix, drawn from the lists in *Hànyǔ Fāngyīn Zìhuì* and *Hànyǔ Fāngyīn Cíhuì*. Clearly, the two commonest Taiwanese Southern Mǐn *goose* forms are identical to Xiàmén [go˨˦] and [gia˨˦]

Mainland China *goose* forms





These two maps plot the Mainland *goose* data in table τ13, based on the forms from *Hànyǔ Fāngyīn Zìhuì* and *Hànyǔ Fāngyīn Cíhuì* respectively.

§4. **Etymology**.

§4.1. 鵝 *é* ‘domestic goose’.

Taiwanese Southern Mĭn *giâ* and *gô*, the so-called *colloquial* vs. *reading* (or *literary*) forms respectively in contemporary Taiwanese use, are cognate. *Giâ* comes from proto-Mĭn ***ŋiɑi***[1] and *gô* from Middle Chinese ***ŋa***[1]. Both have undergone the Southern Mĭn denasalization of nasals before oral vowels. And both ultimately may come from Old Chinese ***ŋai***.

(a) Douglas 1873, pp.107a & 110a: *giâ* (C), *gô*, *ngô·* (R).[14]
(b) *GS* 2p, K23 no.679 (p.210): M *é* < MC ˷ŋâ < OC *ŋâ (Meng).
(c) Norman 1973, p.236 & 1981, p.49, §3.2: pMĭn *ŋ + *-iɑi.
(d) Pulleyblank 1991.86: M *é* 鵝 ‘goose’ < eM ɔ´ < ℓMC ŋa < eMC ŋa; *JCL* monogr. 8, p.192: eMC ŋɔ < *ŋál < *ăxal (?) ≈ pIE *ǵʰand- (Pok. p.412: Pliny’s OGmc *ganta* (kind of goose), OIr *géd*).
(e) Lĭ & Zhōu 1993, p.297: M ɤ② < eM ŋɔ② < MC ŋɑ① < OC ŋai①.

§4.2. **Sino-European**.

The temptation for Indo-Europeanists to compare Chinese with Indo-European has proven hard to resist. When I saw the Old Chinese reconstruction *ɡans ‘wild goose’, the wild leap to proto-Indo-European *ǵʰans ‘goose’ was not hard to make. The following table collects various reconstructions for *hàn* 翰, 鶾 with their glosses.

	Ref.		MC	OC	Defⁿ.
1	K23 no.65	翰	ɣân˻		‘to soar; red feathers; pen, pencil; write’
2	*GS* 140f	翰	ɣân	*ɡ’ân	‘pheasant feather; wing; to fly’
3	*DEZ* 223b	翰	ɣân`	L*ɡanʰ, S*ɡans < *ɡars	‘Perhaps: to spread the wings’
4	Pulleyblank 119	翰	ɣanʰ		‘plume of a pheasant; soar; quill, pen’
5	Baxter 761	翰	hanʰ	*ɡans	
6	*GS* 140j	鶾	ɣân	*ɡ’ân	‘a bird with variegated feathers’

To these authoritative glosses, popular dictionaries add further grist for the mill (*hàn* 翰, 雗):

7	Mathews 1943, no.2042	翰	‘a pen or pencil; red feathers of the pheasant; to fly high; a support; the desert called Gobi’
8	Liáng 1972, no.4558	翰	‘white horse; feather; a piece of writing’
9	Yè 2000, p.212b	翰	‘a white horse; a long and hard feather; a piece of writing’
10	Wú 1981, p.267a	翰	‘writing brush; write (with a brush); writing’
11	Mathews 1943, no.2044	雗	‘a white pheasant’

In my scenario, pIE *ǵʰans ‘goose’ is borrowed into proto-Chinese as *ɡans. But there is already a native Chinese word for ‘goose’, i.e., *ŋai. Therefore, the borrowed word is semantically narrowed to ‘wild goose’ and its initial is assimilated to *ŋ- under the synonymous influence of *ŋai, producing *ŋans. The original form of the borrowing, however, is kept with extremely specialized meanings: *ɡans ‘exotic bird; feather’.[15]

[14] Branner 2000, p.360: Kengyunn {ŋɤ²}; p.135: Amoy *go*²; p.401, n.270: “Amoy has two other forms *gia*² and *ŋõ*².”

[15] Such a semantic reconstruction reminds me of Kurylowicz’s fourth law of analogy (cited in Collinge 1985, p.249), which I adapt as follows: Given a derivation (in this particular case the borrowed *ɡans) resulting in two differentiated forms, the derived form (*ŋans) takes over the primary meaning (*‘goose’) and the old form (*ɡans) is reserved for secondary function (*‘other fowl, ... feather’).

pIE *ĝʰans ‘goose’ → pCh *ɢans > OC *ɢans ‘exotic bird 鶤, 鶡’, ‘feather 翰’
↓
OC *ŋans ‘wild goose 雁’ ⇐ OC *ŋɑ ‘goose 鵝’

(a) *GS* 186a; K23, no.243, p.97: M *yàn* < MC ŋɑnᴞ < OC *ŋɑn.
(b) Benedict 1972, p.157-159 (cited in Sagart 1999, p.135): *ŋâ ‘goose’ (*é* 鵝) ~ *ŋăn ‘geese in flocks’ (*yàn* 雁 ~ 鴈 ‘wild goose’), with pST **n (collective suffix).
(c) Forrest 1973, p.136 connects 鴈 with IE cognates.
(d) Shafer 1974, Siamese hān’ ‘goose’ < *ŋhān.
(e) Coblin 1986, p.87 S-T **ngr̄an + -h → OC *ngranh; **ngr̄an → WrBurmese ngàn.
(f) Schüssler 1987 715b *ŋərəns (Li Fang-kui *ŋranh).
(g) Zhāng 1988, pp.12 & 38: pIE *ĝʰans : OC gans, MC ŋean去, eM ean⁴, M *yàn*.
(h) Pulleyblank 1991, p.358: M *yàn* 雁 ~ 鴈 ‘wild goose’ < eM jan` < ℓMC ŋjaːn` < eMC ŋɛːnʰ < ŋaɨnʰ.
(i) Norman 1991, p.212 no.49: ‘wild goose’ with *hŋ- in pMin; Thai [hɑːn]ᴮᵀ, Wǔmíng [hɑːn]⁵, VN [ŋɑn].
(j) Baxter 1992, p.800: M *yàn* < eMC ŋænʰ < OC ŋrɑns; Wang Li 433.
(k) Lǐ & Zhōu 1993, p.202.4 *hàn*翰: OC *ɣan①, MC ɣɑn①, eM han②, (no M), Wú [fiɔnˈ]⑤, Gàn [honˈ]⑤, Yuè [hɔnˌ]⑥; SoMǐn [hanˊ, ˌ]②⑤.
(l) Buck 1949, p.177, §3.56.
(m) Pokorny 1959, p.41f. pIE*ĝʰans.
(n) Mallory & Adams 1997, p.236: pIE*ĝʰans, possibly the greylag goose (Anser anser).

§4.2.1. ***yàn*** 雁 ~ 鴈 **‘wild goose’**.

The close association of the ‘domestic goose’ with ‘wild goose’ is plainly evidenced by the tautological, even alliterative 雁鵝 compounds in the fāngyán table below: Méixiàn [ŋi̯anˋ.ŋɔˌ] (Hakka), Chéngdū [ŋɑnˊ.ŋoˊ] (SW Mandarin), and Sūzhōu [ŋEˋˊ.ŋəu̯ㄠ] (N Wú). (Cf. English *hound dog*, *kitty cat*.)

HFZ	HFC	Fāngyàn Group	*HFZ²* 262.3	*HFC* 37a
		Mandarin		
1	1	Běijīng (Guānhuà)	[i̯ɛnˋ]⊃	[taˋ.i̯anˋ]大雁
2	2	Jìlǔ 冀魯	[i̯æˌ]⊃	[taˌ.i̯æˌ]大雁
	3	NE		[taˋ.i̯anˋ]大雁
3	4	Zhōngyuán 中原	[i̯æ˥]⊃	[ta˥.i̯æ˥]大雁
4		Jìn 晉	[i̯e˥]⊃	
5		SW	[i̯ɛn ~ ŋan˥]⊃	
6	5		[ŋɑnˊ]⊃	[ŋɑnˊ.ŋoˊ]雁鵝
	6			[taˊ.i̯ɛˊ]大雁
7	7	Jiānghuái 江淮	[i̯ĩˎ]⊃	[taˋ.i̯ĩˎ.tsə·]大雁子
8	8		[iæ̃˥]⊃	[i̯ɛ̃˥]雁
9	9	**Wú** 吳 N	[iɪˌ]⊃ ~ [ŋEˌ]⊇	[ŋEˋˊ.ŋəu̯ㄠ]雁鵝
10	10	S	[ŋa~gaˌ]⊇	[tʰiˊ.gaˌ.ŋˌ]天□雁
11	11	**Xiāng** 湘	[ŋan˥]⊃ ~ [ŋanˌ]⊇	[tai̯ˌ.ŋan˥]大雁
12			[ŋaˊ]⊇	
13	12	**Gàn** 贛	[ŋanˌ]⊇	[ŋanˌ]雁
14	13	**Hakka** 客家	[ŋianˋ]⊃	[ŋi̯anˋ.ŋɔˌ]雁鵝
15	14	**Yuè** 粵	[ŋanˌ]⊇	[ŋanˌ]雁
16	15		[ŋɔnˏ]⊇	[ŋɔn⁴⁵⁴]雁
		Mǐn 閩		
17	16	S.Mǐn QuánZhāng 泉漳州	[ganˊ]⊇	[ŋanˊ]雁
18	17	Cháoshàn	⊆[ŋaŋ˩]	[ŋaŋ˩]雁, [hai̯˧˥.go˥]海鵝
19	18	E.Mǐn Hóuguān	[ŋaŋˇ]⊇	[ŋaŋˇ]雁
20		N.Mǐn	[ŋaiŋ˥]⊇	

Table τ1: Goose responses, background factors pt.1: age, sex, education, languages, ethnicity.

Factors φ1-φ5	Interviews		φ1 Birthyear			φ2 Gender				φ3 Educ.			φ4 Stratum					φ5 Ethnic Zone				
Query, pt. 1	n	λ/1,018	μ_{by}	ε_{by}	σ	♂	♀	♂/♀	κ_{sx}	μ_{ed}	ε_{ed}	σ	Hk	Jp	Mc	Jp/Mc	κ_{st}	Q	Z	Q/Z	κ_{ez}	Hk
Norms:	**1,018**	(100%)	**1934** (1901-79)	(∅)	15	**529**	**479**	1.1044	(∅)	**7** (0-23)	(∅)	5	**155**	**500**	**755**	0.6623	(∅)	**499**	**385**	1.2961	(∅)	106
λ1 *Gô* ± *-á*	**744**	**73%**	**1933** (1901-79)	**-1**	14	**412**	**322**	1.2795	**+16**	**7** (0-20)	**0**	5	69	**390**	**546**	0.7143	**+8**	**345**	**345**	1.0000	**-23**	35
λ1a [gɯʌ̹± ɑ˥]	**32**	**3%**	**1930** (1913-60)	**-4**	11	18	14	1.2857	+16	6 (0-20)	-1	5	1	15	18	0.8333	**+26**	20	12	1.6667	+29	0
λ1b [gu̟ʌ̹]	3		1942 (1929-58)	+8	15	2	1	2.0000	+81	11 (6-17)	+4	6	1	1	3	0.3333	-50	1	2	0.5000	-61	0
λ1c [guʌ̹ ± ɑ˥]	**81**	**8%**	**1927** (1901-48)	-7	10	**49**	**30**	1.6333	**+48**	**5** (0-20)	-2	4	3	**45**	**51**	0.8824	**+33**	**45**	**34**	1.3235	**+2**	1
λ1d [gu̟ʌ̹ ± ɑ˥]	9		1928 (1915-39)	-6	10	5	2	2.5000	+126	4 (0-10)	-3	4	0	3	4	0.7500	+13	3	4	0.7500	-42	0
λ1e [go̟ʌ̹ ± ɑ˥]	**39**	**4%**	**1924** (1902-54)	-10	11	23	15	1.5333	+39	5 (0-16)	-2	5	4	**19**	**23**	0.8261	**+25**	18	11	1.6364	+26	5
λ1f [gɤʌ̹ ± ɑ˥]	**209**	**21%**	**1937** (1904-77)	**+3**	15	**101**	**108**	0.9352	**-15**	**8** (0-20)	**+1**	6	11	**89**	**159**	0.5597	**-15**	**132**	**69**	1.9130	**+48**	6
λ1g [gɣ̞ʌ̹ ± ɑ˥]	18	2%	1934 (1904-50)	Ø	11	9	8	1.1250	+2	8 (0-14)	+1	4	2	9	15	0.6000	-9	9	8	1.1250	-13	1
λ1h [go̟ʌ̹ ± ɑ˥]	**34**	**3%**	**1937** (1913-74)	+3	13	18	16	1.1250	+2	8 (0-18)	+1	5	2	19	28	0.6786	**+2**	11	22	0.5000	-61	0
λ1i [goʌ̹ ± ɑ˥]	**295**	**29%**	**1931** (1904-77)	**-3**	13	**175**	**114**	1.5351	**+39**	**7** (0-20)	**0**	5	42	**178**	**217**	0.8203	**+24**	**93**	**175**	0.5314	**-59**	18
λ1j [gəʌ̹ ± ɑ˥]	20	2%	1945 (1905-79)	+11	18	7	12	0.5833	-47	11 (0-16)	+4	5	0	8	17	0.4706	-29	8	8	1.0000	-23	1
λ1m [gɔʌ̹]	20	2%	1942 (1920-75)	+8	16	11	9	1.2222	+11	9 (0-16)	+2	4	5	10	19	0.5263	-21	5	10	0.5000	-61	4
λ2 *Giâ* ± *-á*	**232**	**23%**	**1935** (1904-76)	+1	14	**118**	**111**	1.0631	**-4**	**7** (0-23)	**0**	5	22	**97**	**167**	0.5808	**-12**	**187**	**31**	6.0323	**+365**	10
λ3 *É*	14	1%	1961 (1938-77)	+27	15	6	8	0.7500	-32	12 (3-18)	+8	5	0	3	13	0.2308	-65	3	8	0.3750	-71	0
λ4 *Ah*	29	3%	1931 (1904-76)	-3	15	8	21	0.3810	**-66**	4 (0-14)	-3	4	6	15	19	0.7895	+19	15	8	1.8750	+45	4
λ5 Gap	10	1%	1968 (1926-76)	**+34**	16	3	7	0.4286	-61	14 (6-18)	**+7**	4	1	2	10	0.2000	-70	5	4	1.2500	-4	0
λH *Ngô* ± *-tsɨ*	**86**	**9%**	**1933** (1910-74)	**-1**	14	**33**	**53**	0.6226	**-43**	**7** (0-18)	**Ø**	5	**78**	**43**	**71**	0.6056	**-9**	10	9	1.1111	-14	**64**
λH1 *Ngô·*	**72**	**7%**	**1934** (1910-74)	**Ø**	14	26	**46**	0.5652	**-49**	**7** (0-17)	**Ø**	5	**64**	**33**	**62**	0.5323	**-20**	5	9	0.5556	-57	**55**
λH2 *Ngô·-tsɨ*	14	1%	1929 (1913-60)	**-5**	13	7	7	1.0000	-9	8 (0-18)	+1	5	14	10	9	1.1111	+68	5	0	∞		9

Table τ2: Goose responses, background factors pt.2: occupation

Factor φ6	Int	φ6.1				φ6.2			φ6.3			φ6.4			φ6.5			φ6.6			φ6.7			φ6.8	φ6.9	φ6.10	φ6.11	φ6.12	φ6.13	φ6.14	
Query, pt. 2	n	Agr	Agr/n	κ_{oa}		Hw	Hw/n	κ_{oh}	Bus	Bus/n	κ_{ob}	Lab	Lab/n	κ_{ol}	Gov	Gov/n	κ_{og}	Edu	Edu/n	κ_{oe}	Stu	Stu/n	κ_{os}	MedW	RelX	Mil	Fis	MedC	RelT	?	$\kappa_{o?}$
Norms:	**1,018**	**283**	0.2780	(∅)		**188**	0.1847	(∅)	**180**	0.1768	(∅)	**66**	0.0648	(∅)	**54**	0.0531	(∅)	**46**	0.0452	(∅)	**51**	0.0501	(∅)	**12**	**18**	**6**	**7**	**2**	**5**	**100**	(∅)
λ1 *Gô ± -á*	**744**	**222**	0.2984	**+7**		**124**	0.1667	**-10**	**135**	0.1815	**+3**	**44**	0.0591	**-9**	**41**	0.0551	**+4**	**36**	0.0484	**+7**	**28**	0.0376	**-25**	9	16	4	6	2	4	**73**	0
λ1a [gɯʎ± ɑ̰]	**32**	11	0.3438	**+24**		5	0.1563	-15	7	0.2188	+24	2	0.0625	-4	2	0.0625	+18								2						3	-5
λ1b [gu̯ʎ]	3	1	0.3333	+20												0.0000	-100	1	0.3333	+638											1	+239
λ1c [guʎ ± ɑ̰]	**81**	**34**	0.4198	**+51**		6	0.0741	-60	11	0.1358	-23	4	0.0494	-24	5	0.0617	+16	5	0.0617	+37					1		2			13	+63
λ1d [gu̯ʎ ± ɑ̰]	9	5	0.5556	+100											1	0.1111	+109												1		
λ1e [go̯ʎ ± ɑ̰]	**39**	17	0.4359	+57		5	0.1282	-31	4	0.1026	-42	1	0.0256	-60	2	0.0513	-3	2	0.0513	+13				1						7	+83
λ1f [gɤʎ ± ɑ̰]	**209**	**57**	0.2727	**-2**		**35**	0.1675	**-9**	**45**	0.2153	**+22**	7	0.0335	-48	11	0.0526	-1	11	0.0526	+16	14	0.0670	+34	4	9		2			14	-32
λ1g [gɣ̞ʎ ± ɑ̰]	18	5	0.2778	0		5	0.2778	+50	3	0.1667	-6				2	0.1111	+109	1	0.0556	+23												
λ1h [go̯ʎ ± ɑ̰]	**35**	7	0.2000	-28		8	0.2286	+24	7	0.2000	+13	1	0.0286	-56	2	0.0571	+8	4	0.1143	+153	1	0.0286	-43		1	1				2	-42
λ1i [goʎ ± ɑ̰]	**298**	**87**	0.2919	**+5**		**51**	0.1711	-7	**51**	0.1711	**-3**	**25**	0.0839	**+29**	14	0.0470	-11	12	0.0403	-11	9	0.0302	-40	3	3	3	2	2	3	**30**	**+2**
λ1j [gɔʎ ± ɑ̰]	20	3	0.1500	-46		4	0.2000	+8	4	0.2000	+13				1	0.0500	-6				2	0.1000	+100	1						4	+104
λ1m [gɔʎ]	20	3	0.1500	-46		5	0.2500	+35	4	0.2000	+13	3	0.1500	+131	2	0.1000	+89				2	0.1000	+100	1							
λ2 *Giâ ± -á*	**232**	**64**	0.2759	**-1**		**47**	0.2026	**+10**	**31**	0.1336	**-24**	**20**	0.0862	**+33**	11	0.0474	-11	11	0.0474	+5	8	0.0345	-31	5	6		3		2	**24**	+5
λ3 *É*	14					3	0.2143	+16	2	0.1429	-19				1	0.0714	+35				7	0.5000	+898							1	-27
λ4 *Ah*	29	7	0.2414	-13		12	0.4138	+124	2	0.0690	-61	1	0.0345	-47							1	0.0345	-31							3	+5
λ5 Gap	10								1	0.1000	-43				1	0.1000	+89				7	0.7000	+1297							1	+2
λH *Ngô ± -tsɨ*	**86**	18	0.2093	-25		22	0.2558	+39	19	0.2209	+25	6	0.0698	+8	6	0.0698	+32	2	0.0233	-49	2	0.0233	-54	2		2				7	-92
λH1 *Ngô·*	**72**	13	0.1806	-33		22	0.3056	+66	14	0.1944	+10	6	0.0833	+29	5	0.0694	+31	2	0.0278	-39	2	0.0278	-45	1		1				6	-92
λH2 *Ngô·-tsɨ*	14	5	0.3571	+29					5	0.3571	+102				1	0.0714	+35							1		1				1	-93

κ_{agr} = 100 * [(λ occ total)/(λ total)] / [(occ total) / (goose int total)]. E.g.: κ_{agr} = 100 * [(λ1 agr total)/(λ1 total)] / [(agr total) / (goose int total)], κ_{agr} = 100 * (222/744)/(283/1018) – 100

Table τ3: λ1, *gô* vs. *gô-á* etc., background factors pt.1: age, sex, education, languages, ethnicity.

Factors φ1-φ5	Interviews		φ1 Birthyear			φ2 Gender				φ3 Educ.			φ4 Stratum					φ5 Ethnic Zone				
Query, pt. 1	n	λ/1,018	μ_b	ε_b	σ	♂	♀	♂/♀	κ_g	μ_e	ε_e	σ	Hk	Jp	Mc	Jp/Mc	κ_s	Q	Z	Q/Z	κ_e	Hk
Norms:	**1,018**	(100%)	**1934** (1901-79)	(Ø)	15	**529**	**479**	1.1044	(∅)	**7** (0-23)	(∅)	5	155	**500**	**755**	0.6623	(∅)	**499**	**385**	1.2961	(∅)	106
λ1 *Gô ± -á*	**744**	**73%**	**1933** (1901-79)	**-1**	14	**412**	**322**	1.2795	**+16**	7 (0-20)	**0**	5	69	**390**	**546**	0.7143	**+8**	**345**	**345**	1.0000	**-23**	35
λ1aØ [gɯʌ]	14	1.4%	1934 (1904-1950)	Ø	13	7	6	1.1667	+6	8 (0-14)	+4		1	5	11	0.4545	-31	8	6	1.3333	+3	
λ1aa [gɯʌ.ɑ\]	4	0.4%	1936 (1929-1941)	+2	5	2	2	1.0000	-9	8 (6-12)	+1	3	1	4	4	1.0000	+51	1	2	0.5000	-61	1
λ1cØ [guʌ]	28	2.8%	1927 (1901-1944)	+4	11	17	9	1.8889	+71	6 (0-20)	-1	5	1	16	17	0.9412	+42	15	12	1.2500	-4	
λ1ca [guʌ.ɑ\]	**53**	5%	**1927** (1908-1948)	**-7**	10	**32**	**21**	1.5238	**+38**	**5** (0-15)	**-2**	4	2	29	**34**	0.8529	**+29**	**30**	**22**	1.3636	**+5**	1
λ1dØ [gu̟ʌ]	3	0.3%	1930 (1918-1938)	-4	10	3				6 (3-10)	-1	4		1	3	0.3333	-50	1	2	0.5000	-61	
λ1da [gu̟ʌ.ɑ\]	6	0.6%	1930 (1915-1944)	-4	11	3	2	1.5000	+36	2 (0-6)	-5	3		3	2	1.5000	+126	3	3	1.0000	-23	
λ1eØ [go̟ʌ]	20	2%	1922 (1909-1939)	-12	8	11	9	1.2222	+11	6 (0-16)	-1	5	2	8	13	0.6154	-7	9	6	1.5000	+16	3
λ1ea [go̟ʌ.ɑ\]	19	1.9%	1926 (1902-1954)	-8	12	12	6	2.0000	+81	4 (0-13)	-3	4	2	11	10	1.1000	+66	9	8	1.1250	-13	2
λ1fØ [gɤʌ]	**72**	7%	**1940** (1914-1977)	**+6**	17	**44**	**28**	1.5714	+42	**9** (0-20)	**+2**	6	4	**31**	**56**	0.5536	**-16**	**45**	23	1.9565	**+51**	3
λ1fa [gɤʌ.ɑ\]	**137**	14%	**1936** (1904-1975)	**+2**	14	**57**	**80**	0.7125	-35	**7** (0-20)	**0**	5	7	**58**	**103**	0.5631	**-15**	**87**	**46**	1.8913	**+46**	3
λ1gØ [gɣ̟ʌ]	14	1.4%	1934 (1904-1950)	0	13	7	6	1.1667	+6	8 (0-14)	+1	4	1	5	11	0.4545	-31	8	6	1.3333	+3	
λ1ga [gɣ̟ʌ.ɑ\]	4	0.4%	1936 (1929-1941)	+2	5	2	2	1.0000	-9	8 (6-12)	+1	3	1	4	4	1.0000	+51	1	2	0.5000	-61	1
λ1hØ [go̟ʌ]	19	1.9%	1938 (1916-1974)	+4	15	10	9	1.1111	+1	6 (0-17)	-1	4	1	13	16	0.8125	+23	7	11	0.6364	-51	
λ1ha [go̟ʌ.ɑ\]	15	1.5%	1935 (1913-1951)	+1	14	8	7	1.1429	+3	8 (0-18)	+1	5	1	6	12	0.5000	-25	4	11	0.3636	-72	
λ1iØ [goʌ]	**154**	15%	**1932** (1904-1977)	**-2**	14	**96**	**52**	1.8462	+67	**7** (0-20)	**0**	4	13	**94**	**114**	0.8246	**+24**	**56**	**88**	0.6364	**-51**	8
λ1ia [goʌ.ɑ\]	**140**	14%	**1929** (1907-1975)	**-5**	11	**79**	**61**	1.2951	+17	**6** (0-18)	**-1**	5	27	**84**	**102**	0.8235	**+24**	**38**	**85**	0.4471	**-66**	10
λ1jØ [gəʌ]	19	1.87%	1944 (1905-1979)	+10	18	7	11	0.6364	-42	11 (0-16)	+4	5		8	16	0.5000	-25	7	8	0.8750	-32	1
λ1ja [gəʌ.ɑ\]	1	1.38%	1961	+27			1			9	+2				1			1				

Table τ4: λ1, *gô* vs. *gô-á*, background factors pt.2: occupation

Factor φ6	Int	φ6.1			φ6.2			φ6.3			φ6.4			φ6.5			φ6.6			φ6.7			φ6.8	φ6.9	φ6.10	φ6.11	φ6.12	φ6.13	φ6.14	
Query, pt. 2	n	Agr	Agr/n	κ_{oa}	Hw	Hw/n	κ_{oh}	Bus	Bus/n	κ_{ob}	Lab	Lab/n	κ_{ol}	Gov	Gov/n	κ_{og}	Edu	Edu/n	κ_{oe}	Stu	Stu/n	κ_{os}	MedW	RelX	Mil	Fis	MedC	RelT	?	$\kappa_{o?}$
Norms:	**1,018**	**283**	0.2780	(∅)	**188**	0.1847	(∅)	**180**	0.1768	(∅)	**66**	0.0648	(∅)	**54**	0.0531	(∅)	**46**	0.0452	(∅)	**51**	0.0501	(∅)	**12**	**18**	**6**	**7**	**2**	**5**	**100**	(∅)
λ1 *Gô ± -á*	**744**	**222**	0.2984	**+7**	**124**	0.1667	**-10**	**135**	0.1815	**+3**	**44**	0.0591	**-9**	**41**	0.0551	**+4**	**36**	0.0484	**+7**	**28**	0.0376	**-25**	9	16	4	6	2	4	**73**	0
λ1aØ [gɯʎ]	14	6	0.4286	+54	2	0.1429	-23	4	0.2857	+62	1	0.0714	+10	2	0.1429	+169	1	0.0714	+58					2						
λ1aa [gɯʎ.ɑ˥]	18	5	0.2778	0	3	0.1667	-10	3	0.1667	-6	2	0.1111	+71	2	0.1111	+109													3	
λ1cØ [guʎ]	28	10	0.3571	+28	3	0.1071	-42	6	0.2143	+21	1	0.0357	-45	2	0.0714	+35								1		1			4	-57
λ1ca [guʎ.ɑ˥]	**53**	24	0.4528	**+63**	3	0.0566	-69	5	0.0943	-47	3	0.0566	-13	3	0.0566	+7	5	0.0943	+109							1			9	-4
λ1dØ [gu̟ʎ]	3	1	0.3333	+20										1	0.3333	+528												1		
λ1da [gu̟ʎ.ɑ˥]	6	4	0.6667	+140							1	0.1667	+157	1	0.1667	+214														
λ1eØ [go̟ʎ]	20	7	0.3500	+26	3	0.1500	-19	4	0.2000	+13							2	0.1000	+121				1						3	-68
λ1ea [go̟ʎ.ɑ˥]	19	10	0.5263	+89	2	0.1053	-43				1	0.0526	-19	2	0.1053	98													4	-68
λ1fØ [gɤʎ]	**72**	20	0.2778	**0**	10	0.1389	-25	11	0.1528	-14	4	0.0556	-14	3	0.0417	-22	3	0.0417	-8	9	0.1250	+231	3	4					5	-47
λ1fa [gɤʎ.ɑ˥]	**137**	**37**	0.2701	**-3**	25	0.1825	-1	**34**	0.2482	**+40**	3	0.0219	-66	8	0.0584	10	8	0.0584	+29	5	0.0365	+84	1	5		2			9	-4
λ1gØ [gɣ̟ʎ]	14	4	0.2857	+3	3	0.2143	+16	3	0.2143	+21	1	0.0714	+10	2	0.1429	169	1	0.0714	+58												
λ1ga [gɣ̟ʎ.ɑ˥]	4	1	0.2500	-10	2	0.5000	+171	1	0.2500	+41																				
λ1hØ [go̟ʎ]	19	4	0.2105	-24	3	0.1579	-15	3	0.1579	-11	1	0.0526	-19	2	0.1053	98	3	0.1579	+249	1	0.0526	-63			1				1	-89
λ1ha [go̟ʎ.ɑ˥]	15	3	0.2000	-28	5	0.3333	+80	4	0.2667	+51							1	0.0667	+47					1					1	-89
λ1iØ [goʎ]	**154**	**38**	0.2468	**-11**	24	0.1558	-16	27	0.1753	-1	14	0.0909	+40	9	0.0584	10	5	0.0325	-28	7	0.0455	+157	1	2	1	2	1	3	20	+102
λ1ia [goʎ.ɑ˥]	**140**	**48**	0.3429	**+23**	27	0.1929	+4	24	0.1714	-3	11	0.0786	+21	6	0.0429	-19	7	0.0500	+11	2	0.0143	-26	1	1	2		1		10	-4
λ1jØ [gəʎ]	19	3	0.1579	-43	4	0.2105	+14	4	0.2105	+19				1	0.0526	-1				2	0.1053	-26	1						4	-57
λ1ja [gəʎ.ɑ˥]	1				1																									

Tables τ5 & τ6: λ2, *giâ* vs. *giâ-á*, background factors pt.1: age, sex, education, languages, ethnicity; pt.2: occupation

τ5 φ 1-φ5 Query, pt. 1	Interviews		φ1 Birthyear			φ2 Gender				φ3 Educ.			φ4 Stratum					φ5 Ethnic Zone				
	n	λ/1,018	μ_b	ε_b	σ	♂	♀	♂/♀	κ_g	μ_e	ε_e	σ	Hk	Jp	Mc	Jp/Mc	κ_s	Q	Z	Q/Z	κ_e	Hk
Norms:	**1,018**	(100%)	**1934** (1901-79)	(Ø)	15	**529**	**479**	1.1044	(∅)	**7** (0-23)	(∅)	5	155	**500**	**755**	0.6623	(∅)	**499**	**385**	1.2961	(∅)	106
λ2 *Giâ ± -á*	**233**	0.2289	**1935** (1904-1976)	**+1**	14	**118**	**112**	1.0536	-5	7 (0-23)	0	5	22	**97**	**167**	0.5808	**-12**	**188**	**31**	6.0645	**+368**	10
λ2 ... others say	12	0.0118	1928 (1904-1937)	-6	9	8	2	4.0000	+262	8 (0-20)	+1		1	6	8	0.7500	+13	7	4	1.7500	+35	
λ2Ø [gi̯aɹ]	**214**	0.2102	**1934** (1904-1976)	**0**	13	**113**	**98**	1.1531	**+4**	7 (0-22)	0	5	17	**91**	**157**	0.5796	**-12**	**174**	29	6.0000	**+363**	8
λ2a [gi̯aɹ.aʔ]	11	0.0108	1935 (1922-65)	+1	13	5	6	0.8333	-25	7 (0-19)	0	6	1	7	6	1.1667	+76	9	1	9.0000	+594	1
λ2c [gi̯aʔɹ]	1	0.0010	1942	+8			1			15	+8				1			1				
λ2i *Iâ ± -á*	17	0.0167	1938 (1913-1974)	+4	18	5	12	0.4167	-62	6 (0-23)	-1	7	5	6	9	0.6667	+1	12	2	6.0000	+363	2
λ2iØ [i̯aɹ]	11	0.0108	1933 (1913-1974)	-1	17	3	8	0.3750	-66	6 (0-15)	0	5	4	4	7	0.5714	-14	6	2	3.0000	+131	2
λ2ia [i̯aɹ.aʔ]	6	0.0059	1947 (1927-1973)	+13	20	2	4	0.5000	-55	7 (0-23)	0	9	1	2	2	1.0000	+51	6				
λ2f [gi̯ɔɹ]	1	0.0010	1924	-10			1			0	-7							1				

τ6 φ6 Query, pt. 2	Int	φ6.1			φ6.2			φ6.3			φ6.4			φ6.5			φ6.6			φ6.7			φ6.8	φ6.9	φ6.10	φ6.11	φ6.12	φ6.13	φ6.14	
	n	Agr	Agr/n	κ_{oa}	Hw	Hw/n	κ_{oh}	Bus	Bus/n	κ_{ob}	Lab	Lab/n	κ_{ol}	Gov	Gov/n	κ_{og}	Edu	Edu/n	κ_{oe}	Stu	Stu/n	κ_{os}	MedW	RelX	Mil	Fis	MedC	RelT	?	$\kappa_{o?}$
Norms:	**1,018**	**283**	0.2780	(∅)	**188**	0.1847	(∅)	**180**	0.1768	(∅)	**66**	0.0648	(∅)	**54**	0.0531	(∅)	**46**	0.0452	(∅)	**51**	0.0501	(∅)	**12**	**18**	**6**	**7**	**2**	**5**	**100**	(∅)
λ2 *Giâ ± -á*	**233**	**65**	0.2790	**Ø**	**47**	0.2017	**+9**	**31**	0.1330	**-25**	20	0.0858	+32	11	0.0472	-11	11	0.0472	+4	8	0.0343	-31	5	6		3		2	24	-90
λ2 ... others say	12	6	0.5000	+80	1	0.0833	-55	2	0.1667	-6														3						
λ2Ø [gi̯aɹ]	**214**	**57**	0.2664	**-4**	**42**	0.1963	**+6**	**30**	0.1402	**-21**	19	0.0888	+37	11	0.0514	-3	11	0.0514	+14	6	0.0280	-44	5	6		3		2	22	-90
λ2a [gi̯aɹ.aʔ]	11	6	0.5455	+96	2	0.1818	-2			-100	1	0.0909	+40				2	0.1818	+302											
λ2c [gi̯aʔɹ]	1				1	1.0000	+441			-100																				
λ2i *Iâ ± -á*	17	7	0.4118	+48	4	0.2353	+27	1	0.0588	-67	1	0.0588	-9							2	0.1176	+135							2	-88
λ2iØ [i̯aɹ]	11	5	0.4545	+64	3	0.2727	+48													1	0.0909	+81							2	-81
λ2ia [i̯aɹ.aʔ]	6	2	0.3333	+20	1			1	1.6666	+843	1	1.6666	+157							1	1.6666	3,227								
λ2f [gi̯ɔɹ]	1	1	1.0000	+260																										

Table τ7: Hakka queries, background factors pt.1: age, sex, education, languages, ethnicity.

Factors φ1-φ5 Query, pt. 1	Interviews		φ1 Birthyear			φ2 Gender				φ3 Educ.			φ4 Stratum					φ5 Ethnic Zone				
	n	λ/1,018	μ_{by}	ε_{by}	σ	♂	♀	♂/♀	κ_{sx}	μ_{ed}	ε_{ed}	σ	Hk	Jp	Mc	Jp/Mc	κ_{st}	Q	Z	Q/Z	κ_{ez}	Hk
Norms:	**1,018**	(100%)	**1934** (1901-79)	(∅)	15	**529**	**479**	1.1044	(∅)	**7** (0-23)	(∅)	5	**155**	**500**	**755**	0.6623	(∅)	**499**	**385**	1.2961	(∅)	106
λH *Ngô ± -tsɨ*	**86**	**8%**	**1933** (1910-74)	**-1**	14	**33**	**53**	0.6226	**-44**	**7** (0-18)	**Ø**	5	**78**	**43**	**71**	0.6056	**-9**	10	9	1.1111	-14	**64**
[ŋɔ]	**72**	7%	**1933** (1910-74)	**-1**	15	26	**46**	0.5652	**-49**	**7** (0-18)	**Ø**	5	**66**	**36**	**59**	0.6102	**-8**	7	8	0.8750	-32	**54**
[ŋo]	14	1.38%	1933 (1917-47)	-1	11	7	7	1.0000	-9	7 (0-15)	Ø	5	12	7	12	0.5833	-12	3	1	3.0000	+131	10
[˥]^{55}	**53**	5%	**1932** (1910-61)	**-2**	12	24	29	0.8276	-25	**7** (0-18)	**Ø**	5	**52**	**31**	**47**	0.6596	**Ø**	5	2	2.5000	+93	**46**
[˧]^{33}	12	1.18%	1931 (1912-51)	-3	14	3	9	0.3333	-70	6 (0-14)	-1	5	12	2	5	0.4000	-40	2	2	1.0000	-23	8
[˩]^{13}	15	1.47%	1939 (1912-74)	+5	19	4	11	0.3636	-67	7 (0-17)	Ø	5	8	6	13	0.4615	-30	3	4	0.7500	-42	6
[˥˩]^{53}	6	0.59%	1937 (1917-49)	+3	13	2	4	0.5000	-55	10 (6-15)	+3	4	6	4	6	0.6667	+1		1			4
λH1 *Ngô·*	**72**	**7%**	**1934** (1910-74)	**Ø**	14	26	**46**	0.5652	**-49**	**7** (0-17)	**Ø**	5	**64**	**33**	**62**	0.5323	**-20**	5	9	0.5556	-57	**55**
λH2 *Ngô·-tsɨ*	14	1.38%	1929 (1913-60)	-5	13	7	7	1.0000	-9	8 (0-18)	+1	5	14	10	9	1.1111	+68	5				9
[-tsi]	10	0.98%	1929 (1913-60)	-5	14	6	4	1.5000	+36	9 (0-18)	+2	5	10	7	6	1.1667	+76	2				8
[-tsɯ]	4	0.39%	1929 (1929-40)	-5	8	1	3	0.3333	-70	4 (0-9)	-3	5	4	4	3	1.3333	+101	3				1

Table τ8: non-Hakkaphone Minnanophones {863} vs. Hakkaphone Minnanophones {155}, background factors pt.1: age, sex, education, languages, ethnicity

Factors φ1-φ5 Query, pt. 1	Interviews		φ1 Birthyear			φ2 Gender				φ3 Educ.			φ4 Stratum					φ5 Ethnic Zone				
	n	λ/1018	μ_{by}	ε_{by}	σ	♂	♀	♂/♀	κ_{sx}	μ_{ed}	ε_{ed}	σ	Hk	Jp	Mc	Jp/Mc	κ_{st}	Q	Z	Q/Z	κ_{ez}	Hk
Norms:	**1,018**	(100%)	**1934** (1901-79)	(∅)	15	**529**	**479**	1.1044	(∅)	**7** (0-23)	(∅)	5	155	**500**	**755**	0.6623	(∅)	**499**	**385**	1.2961	(∅)	106
-Hk Minnanophones	863	85%	1934 (1901-79)	Ø	14	450	403	1.1166	+7	7 (0-23)	Ø	5	0	417	623	0.6693	+1	463	349	1.3267	+2	29
+Hk Minnanophones	155	15%	1935 (1910-76)	+1	14	79	76	1.040	Ø	8 (0-20)	+1	5	155	83	132	0.6288	-5	36	36	1.0000	-25	77

Table τ9: Hakka queries, background factors pt.2: occupation

Factor φ6	Int	φ6.1			φ6.2			φ6.3			φ6.4			φ6.5			φ6.6			φ6.7			φ6.8	φ6.9	φ6.10	φ6.11	φ6.12	φ6.13	φ6.14	
Query, pt. 2	n	Agr	Agr/n	κ_{oa}	Hw	Hw/n	κ_{oh}	Bus	Bus/n	κ_{ob}	Lab	Lab/n	κ_{ol}	Gov	Gov/n	κ_{og}	Edu	Edu/n	κ_{oe}	Stu	Stu/n	κ_{os}	MedW	RelX	Mil	Fis	MedC	RelT	?	$\kappa_{o?}$
Norms:	**1,018**	**283**	0.2780	(∅)	**188**	0.1847	(∅)	**180**	0.1768	(∅)	**66**	0.0648	(∅)	**54**	0.0531	(∅)	**46**	0.0452	(∅)	**51**	0.0501	(∅)	**12**	**18**	**6**	**7**	**2**	**5**	**100**	(∅)
λH *Ngô ± -tsɨ*	**86**	18	0.2093	-25	22	0.2558	+39	19	0.2209	+25	6	0.0698	+8	6	0.0698	+31	2	0.0233	-49	2	0.0233	-54	2		2				7	-92
[ŋɔ]	**72**	14	0.1944	-30	20	0.2778	+50	16	0.2222	+26	4	0.0556	-14	3	0.0417	-22	2	0.0278	-39	2	0.0278	-45	2		2				7	-90
[ŋo]	14	4	0.2857	+3	2	0.1429	-23	3	0.2143	+21	2	0.1429	+120	3	0.2143	+304														
[˥]^{55}	**53**	10	0.1887	-32	12	0.2264	+23	14	0.2642	+49	3	0.0566	-13	5	0.0943	+78	1	0.0189	-58				2		2				4	-92
[˧]^{33}	12	6	0.5000	+80	4	0.3333	+80	1	0.0833	-53																			1	-92
[˨˩]^{13}	15	1	0.0667	-76	4	0.2667	+44	2	0.1333	-25	3	0.2000	+209	1	0.0667	+26				2	0.1333	+166							2	-86
[˥˩]^{53}	6	1	0.1667	-40	2	0.3333	+80	2	0.3333	+89							1	0.1667	+269											
λH1 *Ngô·*	**72**	13	0.1806	-35	22	0.3056	+65	14	0.1944	+10	6	0.0833	+29	5	0.0694	+31	2	0.0278	-39	2	0.0278	-45	1		1				6	-92
λH2 *Ngô·-tsɨ*	14	5	0.3571	+28				5	0.3571	+102				1	0.0714	+35							1		1				1	-93
[-tsɨ]	10	4	0.4000	+44				4	0.4000	+126															1				1	-90
[-tsɯ]	4	1	0.2500	-10	1	0.2500	+35							1	0.2500	+371							1							

Table τ10: non-Hakkaphone Minnanophones {863} vs. Hakkaphone Minnanophones {155}, background factors pt.2: occupation

Factor φ6	Int	φ6.1			φ6.2			φ6.3			φ6.4			φ6.5			φ6.6			φ6.7			φ6.8	φ6.9	φ6.10	φ6.11	φ6.12	φ6.13	φ6.14	
Query, pt. 2	n	Agr	Agr/n	κ_{oa}	Hw	Hw/n	κ_{oh}	Bus	Bus/n	κ_{ob}	Lab	Lab/n	κ_{ol}	Gov	Gov/n	κ_{og}	Edu	Edu/n	κ_{oe}	Stu	Stu/n	κ_{os}	MedW	RelX	Mil	Fis	MedC	RelT	?	$\kappa_{o?}$
Norms:	**1,018**	**283**	0.2780	(∅)	**188**	0.1847	(∅)	**180**	0.1768	(∅)	**66**	0.0648	(∅)	**54**	0.0531	(∅)	**46**	0.0452	(∅)	**51**	0.0501	(∅)	**12**	**18**	**6**	**7**	**2**	**5**	**100**	(∅)
-Hk Minnanoph.	863	243	0.2816	+1	159	0.1639	-11	148	0.1715	-3	55	0.0637	-2	44	0.0510	-4	39	0.0419	-7	45	0.0521	+4	9	15	4	7	2	5	88	+4
+Hk Minnanoph.	155	40	0.2581	-7	29	0.1613	-13	32	0.2065	+16	11	0.0710	+10	10	0.0645	+27	7			6			3	3	2				12	-21

Table τ11: Initial-*g* deletion {33}, background factors pt.1: age, sex, education, languages, ethnicity

Factors φ1-φ5	Interviews		φ1 Birthyear			φ2 Gender				φ3 Educ.			φ4 Stratum					φ5 Ethnic Zone				
Query, pt. 1	n	λ/1018	μ_{by}	ε_{by}	σ	♂	♀	♂/♀	κ_{sx}	μ_{ed}	ε_{ed}	σ	Hk	Jp	Mc	Jp/Mc	κ_{st}	Q	Z	Q/Z	κ_{ez}	Hk
Norms:	**1,018**	(100%)	**1934** (1901-79)	(∅)	15	**529**	**479**	1.1044	(∅)	**7** (0-23)	(∅)	5	155	**500**	**755**	0.6623	(∅)	**499**	**385**	1.2961	(∅)	106
Eroded initial *g*	33	3.24%	1948 (1913-77)	+14		13	20	0.6500	-41	9 (0-23)	+2		6	10	24	0.4167	-37	16	11	1.4546	+12	2
Non-*g* λ1 & λ3	16	1.57%	1959 (1927-77)	+25	16	8	8	1.0000	-10	12 (3-18)	+5		1	4	15	0.2667	-60	4	9	0.4444	-66	
λ1jf [əu̯ɹ]	1		1973	+39		1				18	+11				1				1			
λ1mg [ɔɹ]	3		1945 (1927-60)	+11	17	2	1	2.0000		9 (5-15)	+2	5		1	3	0.3333		1	2	0.5000		
λ3a [ɤɹ]	4		1975 (1972-77)	+41	3	2	2	1.0000		16 (14-18)	+9	2	1	1	4	0.2500			2			
λ3b [ɤɹ.ɑ˥]	4		1954 (1938-71)	+20	16	2	2	1.0000		9 (3-14)	+2	5		1	3	0.3333		3	1	3.0000		
λ3c [ɤ̟ɹ]	1		1973	+39			1			15	+8			1	1	1.0000			1			
λ3d [o̟ɹ.ɑ˥]	1		1952	+18		1				12	+5				1				1			
λ3e [oɹ.ɑ˥]	1		1943	+9			1			10	+3				1				1			
λ3f [ʊɹ]	1		1946	12		1				14	+7				1							
λ2i *Iâ* ± *-á*	17	1.67%	1938 (1913-74)	+4	18	5	12	0.4167	-62	6 (0-23)	-1	7	5	6	9	0.6667	+1	12	2	6.0000	+363	2
λ2iØ [i̯ɑɹ]	11	1.08%	1933 (1913-74)	-1	17	3	8	0.3750	-66	6 (0-15)	-1	5	4	4	7	0.5714	-14	6	2	3.0000	+131	2
λ2ia [i̯ɑɹ.ɑ˥]	6	0.59%	1947 (1927-73)	+13	20	2	4	0.5000	-55	7 (0-23)	0	9	1	2	2	1.0000	+51	6				

Table τ12: Initial-*g* deletion, cont’d., background factors pt.2: occupation

Factor φ6	Int	φ6.1			φ6.2			φ6.3			φ6.4			φ6.5			φ6.6			φ6.7			φ6.8	φ6.9	φ6.10	φ6.11	φ6.12	φ6.13	φ6.14	
Query, pt. 2	n	Agr	Agr/n	κ_{oa}	Hw	Hw/n	κ_{oh}	Bus	Bus/n	κ_{ob}	Lab	Lab/n	κ_{ol}	Gov	Gov/n	κ_{og}	Edu	Edu/n	κ_{oe}	Stu	Stu/n	κ_{os}	MedW	RelX	Mil	Fis	MedC	RelT	?	$\kappa_{o?}$
Norms:	**1,018**	**283**	0.2780	(∅)	**188**	0.1847	(∅)	**180**	0.1768	(∅)	**66**	0.0648	(∅)	**54**	0.0531	(∅)	**46**	0.0452	(∅)	**51**	0.0501	(∅)	**12**	**18**	**6**	**7**	**2**	**5**	**100**	(∅)
Eroded init. *g*	33	7			6			5			1			1						9			1						3	
Non-*g* λ1 & λ3	16				2			4						1						7			1						1	
λ1jf [ɔu̯ʌ]	1																			1										
λ1mg [ɔʌ]	3							2															1							
λ3a [ɤʌ]	4																			4										
λ3b [ɤʌ.ɑ˥]	4				1			2												2										
λ3c [ɤ̝ʌ]	1																			1										
λ3d [o̝ʌ.ɑ˥]	1																												1	
λ3e [oʌ.ɑ˥]	1				1																									
λ3f [ʊʌ]	1													1																
λ2i *Iâ* ± *-á*	17	7	0.4118	+48	4	0.2353	+27	1	0.0588	-67	1	0.0588	-9							2	0.1176	+135							2	-88
λ2iØ [i̯ɑʌ]	11	5	0.4545	+64	3	0.2727	+48													1	0.0909	+81							2	-81
λ2ia [i̯ɑʌ.ɑ˥]	6	2	0.3333	+20	1			1	1.6666	+843	1	1.6666	+157							1	1.6666	3,227								

Table τ13: Fāngyán data for *é* 鵝 'domestic goose'

HFZ	HFC	Fāngyàn Group	*HFZ²* 27.7	*HFC* 49b	City	Province	Lat N	Long E
		Mandarin						
1	1	Běijīng (Guānhuà)	⊂[ɤ˧]	[ə˧]鵝	Běijīng 北京	Héběi 河北	39°56′	116°22′
2	2	Jìlǔ 冀魯	⊂[ŋɤ˨]	[ŋə˨]鵝	Jǐ'nán 濟南	Shāndōng 山東	36°39′	117°00′
	3	NE		[ə˧]鵝	Shěnyáng 瀋陽	Liáoníng 遼寧	41°47′	123°25′
3	4	Zhōngyuán 中原	⊂[ŋɤ˧]	[ŋə˧]鵝	Xī'ān 西安	Shǎnxī 陝西	34°16′	108°57′
4		Jìn 晉	⊂[ɣɤ˩]		Tàiyuán 太原	Shānxī 山西	37°52′	112°34′
5		SW	⊂[ŋo ~ o˩]		Wǔhàn 武漢	Húběi 湖北	30°35′	114°16′
6	5		⊂[o˨]	[ŋo˨]鵝	Chéngdū 成都	Sìchuān 四川	30°39′	104°05′
	6			[uo˨]鵝	Kūnmíng 昆明	Yúnnán 雲南	25°03′	102°43′
7	7	Jiānghuái 江淮	⊂[ʊ˥]	[ʊ˥]鵝	Héféi 合肥	Ānhuī 安徽	31°52′	117°17′
8	8		⊂[o˧]	[o˧]鵝	Yángzhōu 揚州	Jiāngsū 江蘇	32°23′	119°26′
9	9	**Wú** 吳 N	⊂[ŋəu˧]	[ŋəu˧]鵝	Sūzhōu 蘇州	Jiāngsū 江蘇	31°19′	120°37′
10	10	S	⊂[ŋ ~ ŋo˨]	[ga˨.ŋ˨]□鵝	Wēnzhōu 溫州	Zhèjiāng 浙江	28°01′	120°39′
11	11	**Xiāng** 湘	⊂[ŋo ~ ŋ˧]	[ŋo˧]鵝	Chángshā 長沙	Húnán 湖南	28°12′	112°59′
12			⊂[ŋʊ˧]		Shuāngfēng 雙峰	Húnán 湖南	26°18′	113°16′
13	12	**Gàn** 贛	⊂[ŋɔ˥]	[ŋɔ˥]鵝	Nánchāng 南昌	Jiāngxī 江西	28°40′	115°54′
14	13	**Hakka** 客家	⊂[ŋɔ˩]	[ŋɔ˧]鵝	Méixiàn 梅縣	Guǎngdōng 廣東	24°18′	116°06′
15	14	**Yuè** 粵	⊂[ŋɔ˨]	[ŋɔ˧˦]鵝	Guǎngzhōu 廣州	Guǎngdōng 廣東	23°08′	113°15′
16	15		⊂[ŋɔ˦]	[ŋɔ^{443}]鵝	Yángjiāng 陽江	Guǎngdōng 廣東	21°51′	111°57′
		Mǐn 閩						
17	16	S.Mǐn QuánZhāng 泉漳	⊂[ɡo (R) ~ ɡia˧ (C)]	[ɡo˧]鵝	Xiàmén 廈門	Fújiàn 福建	24° 27′	118° 05′
18	17	Cháoshàn	⊂[ɡo˥]	[ɡo˥]鵝	Cháozhōu 潮州	Guǎngdōng 廣東	23° 40′	116° 38′
19	18	E.Mǐn Hóuguān	⊂[ŋɔ ~ ŋie˦]	[ŋie˦]鵝	Fúzhōu 福州	Fújiàn 福建	26° 02′	119° 19′
20		N.Mǐn	⊂[ŋyɛ˧]		Jiàn'ōu 建甌	Fújiàn 福建	27° 02′	118° 19′

Table τ14: proto-Indo-European *ĝ^{h}ans- → ‘goose, duck, swan, flamingo’
Pokorny 1959, p.412; Buck 1949, p.177, §3.56; Turner 1966, p.806a, s.v. 13937 *haṃsá-* m. ‘goose’ Rig Veda

Stock	Branch	Reflex
Indic	Sanskrit	*haṃsá-* m., *haṃsī-* f. (‘goose, swan, flamingo’)
	Pali, Aśokan, Prakrit	*haṃsa-* m. ‘goose’
	Ṣiṇā	*hănzạ* m.
	Kāśmīrī	*ünz*^{ü} m.
	Sindhī	*hañju* m.
	Nepāli	*hə̃s* ‘duck’
	Assamese	*hə̃h* ‘duck, goose’
	Baṅglā	*hə̃s*
	Oṛiyā	*hə̃s* ‘swan’
	Hindī	*hə̃s* m. ‘duck, goose, swan’
	Gujarātī, Marāṭhī	*hə̃s* m. ‘goose’
	Koṅkaṇī	*ə̃s* m. ‘drake’
	Sinhalese	*has* ‘goose, flamingo, swan’
	Pañjābī	*hə̃s* m. ‘goose’ (← Skt)
	West Pahāṛī (Bhalesī)	*hɔũs* m. ‘swan(?)’ (← Skt)
Hellenic *k^{h}ans (gen. *k^{h}ansós)	Greek	χήν /k^{h}é:n/ (gen. χηνός, m.f.; Doric χᾱ́ν) → NGk χῆνα)
Italic	Latin	*ānser* (usu. m., psilotic dial. ← *hanser; assim. to *anas*, *anat-* ‘duck’)
Baltic	Lithuanian	*žąsìs*
Slavic *gõsĭ (Gmc *g-, not *z-)	Old Church Slavic	*gusĭ*
	Russian	*гусь* [gus^{j}]
proto-Germanic *gans-		(Gothic *gansus → Span *ganso*, *gansa*)
North Germanic	Old Norse	*gás* (pl. *gǽs*)
West Germanic	Old High German	*gans* (i-stem, > NHG *Gans* f.)
	Old English	*gōs* (f., pl. *gēs* < *gans-iz = Gk χῆνες)
	English	*goose* (cf. *gander* < OE *gan(d)ra* m.)
Celtic *gansī	Irish	*géiss* ‘swan’ (= Skt *haṃsī*)

Table τ15: *Yā* 鴨'duck' 035 Duck etymology.doc; 20060608

HFZ	HFC	Fāngyán Group	*HFZ²* 13.4	*HFC* 49b	City	Province	Lat N	Long E
		Mandarin						
1	1	Běijīng (Guānhuà)	⊂[ia˥]	[ia˥.tsɿ·]鴨子	Běijīng 北京	Héběi 河北	39°56′	116°22′
2	2	Jìlǔ 冀魯	⊂[ia↓]	[ia↓.tsɿ·]鴨子	Jǐ'nán 濟南	Shāndōng 山東	36°39′	117°00′
	3	NE		[ia˧.tsɿ·]鴨子	Shěnyáng 瀋陽	Liáoníng 遼寧	41°47′	123°25′
3	4	Zhōngyuán 中原	⊂[ia↓]	[ȵiɑ↓.tsɿ·]鴨子	Xī'ān 西安	Shǎnxī 陝西	34°16′	108°57′
4		Jìn 晉	[ia˨˩]⊃		Tàiyuán 太原	Shānxī 山西	37°52′	112°34′
5		SW	⊂[ia↓]		Wǔhàn 武漢	Húběi 湖北	30°35′	114°16′
6	5		⊂[ia↓]	[ia↓.tsɿ˩]鴨子	Chéngdū 成都	Sìchuān 四川	30°39′	104°05′
	6			[ia↓.tsɿ·]鴨子	Kūnmíng 昆明	Yúnnán 雲南	25°03′	102°43′
7	7	Jiānghuái 江淮	[iɐʔ˨˩]⊃	[iɐʔ˨.tsə·]鴨子	Héféi 合肥	Ānhuī 安徽	31°52′	117°17′
8	8		[iæʔ˨˩]⊃	[iæʔ˨.tsɛ·]鴨子	Yángzhōu 揚州	Jiāngsū 江蘇	32°23′	119°26′
9	9	**Wú** 吳 N	[aʔ˨˩]⊃	[aʔ˨]鴨	Sūzhōu 蘇州	Jiāngsū 江蘇	31°19′	120°37′
10	10	S	[a˧˩]⊃	[a˧]鴨	Wēnzhōu 溫州	Zhèjiāng 浙江	28°01′	120°39′
11	11	**Xiāng** 湘	[ia (R) ~ ŋa (C)˧]⊃	[ŋa˧]鴨	Chángshā 長沙	Húnán 湖南	28°12′	112°59′
12			⊂[ŋa˧]		Shuāngfēng 雙峰	Húnán 湖南	26°18′	113°16′
13	12	**Gàn** 贛	[ŋat˨˩]⊃	[ŋat˨.tsɿ·]鴨子	Nánchāng 南昌	Jiāngxī 江西	28°40′	115°54′
14	13	**Hakka** 客家	[ap˨]⊂	[ap↓]鴨	Méixiàn 梅縣	Guǎngdōng 廣東	24°18′	116°06′
15	14	**Yuè** 粵	[ap˧]⊂	[ap˧]鴨	Guǎngzhōu 廣州	Guǎngdōng 廣東	23°08′	113°15′
16	15		[ap↓]⊂	[ap↓]鴨	Yángjiāng 陽江	Guǎngdōng 廣東	21°51′	111°57′
		Mǐn 閩						
17	16	S.Mǐn QuánZhāng 泉漳州	[ap (R) ~ aʔ˧ (C)]⊃	[aʔ↓]鴨	Xiàmén 廈門	Fújiàn 福建	24° 27′	118° 05′
18	17	Cháoshàn	[aʔ↓]⊃	[aʔ↓]鴨	Cháozhōu 潮州	Guǎngdōng 廣東	23° 40′	116° 38′
19	18	E.Mǐn Hóuguān	[aʔ˧]⊃	[aʔ˧]鴨	Fúzhōu 福州	Fújiàn 福建	26° 02′	119° 19′
20		N.Mǐn	[a˧]⊃		Jiàn'ōu 建甌	Fújiàn 福建	27° 02′	118° 19′

Table τ16: proto-Indo-European *anət- ‘duck’

(a) Pokorny 1959, p.41f; Buck 1949, p.178, §3.57; Turner 1966, p.51a, no.1127 *ātí-* f. ‘an aquatic bird’ Rig Veda

(b) Mallory-Adams p.171a *h_an̥$h_a$ti- ~ *$h_a$enh$_a$ti- ‘duck’, possibly ‘mallard’ (Anas platyrhyncus platyrhyncus); the earliest archaeological evidence for domesticated duck is from Southeast Asia c. 3000 BC.

Stock	Branch	Reflexes
Indic	Sanskrit	*ātí-ḥ* f. < *h_an̥ti-
	Pali	*āṭa-* f. ‘a partic. king of bird’
	Prakrit	*āḍi-* f.
	Waigalī	*āṛ́ī* f. ‘duck’
	Aṣkũ	*warg-ārī* lit. ‘water-duck’
	...	
	Baṅglā	*āṛi* ‘Turdus ginginianus’ (thrush (songbird))
	Oṛiyā	*āṛi* ‘a webfooted bird’
	Hindī	*āṛ* f.‘Turdus g.’
	Marāṭhī	*āḍī* f.
Hellenic *nāt̯ia	Greek	νῆσσα /nɛ̃ːssa/ (Boeotian νᾶσσα)
Italic	Latin	*anas*, *anat-* (*anatīna* (sc. *caro*) ‘duck meat’)
Baltic *ānt- (< *anət-)	Lithuanian	*ántis*, OPr *antis*
Slavic *o̯ty	Serbian	*ȕ̀tva*
	Old Russian	*utovĭ* (acc.); Ukr. *utjá*; Ru. *Útka*
Germanic *anud-, *anid-		
North Germanic	Old Icelandic	*o̯nd*
West Germanic	Old High German	*enit*, *anut*; NHG *Ente*
	Old Saxon	*anad*
	Old English	*æned*, *ened*

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