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Temperature terms in Lao, Southern Zhuang, Southern Pinghua and Cantonese

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Lao, Southern Zhuang, Southern Pinghua and Cantonese are four languages spoken in Mainland Southeast Asia. The study of the temperature systems in these four languages – two from the Tai family and two from the Sinitic family – provides an interesting test case for the areal study of temperature terms. There has been borrowing of temperature terms between the two families, both between the more modern stages of the languages and between Proto-Tai and Old/Middle Chinese. However, the resemblance in how the temperature continuum is carved up in these languages is not strong.

Keywords: Tai languages, Sinitic languages, Chinese, Mainland Southeast Asia, language contact.

1 Introduction

20131225 draft of: de Sousa, Hilário & Langella, François & Enfield, N.J. 2015. Temperature terms in Lao, Southern Zhuang, Southern Pinghua and Cantonese. In Koptjevskaja-Tamm, Maria (ed.), *Linguistics of temperature* (Typological studies in language 107): 594–638. Amsterdam: John Benjamins. *Do not quote or cite this draft.*

In this paper, we discuss the form and meaning of the temperature terms in four languages: Lao, Southern Zhuang, Southern Pinghua and Cantonese.[1] Lao and Southern Zhuang belong to the Tai language family, while Southern Pinghua and Cantonese belong to the Sinitic language family. They are all part of the Mainland Southeast Asia linguistic area (e.g. Enfield 2005), and these two language families have a long history of mutual influence. We see an intricate pattern of similarities and differences with the temperature terms in these four languages. Southern Zhuang and Southern Pinghua are geographically closest to each other, and they also share more areal (i.e. non-genealogical) similarities with each other. The forms of the temperature terms in all four languages involve borrowing. While some of these terms are relatively recent borrowings, others are terms that can be

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reconstructed in both Proto-Tai and Old or Middle Chinese. The direction of borrowing of these older temperature terms is often difficult to determine. The similarities and differences amongst the temperature terms in these four languages serve as a case study on the areality of temperature terms. The two Sinitic languages are also interesting in that they are spoken in areas considerably warmer than Northern China, where the Chinese language originated. We shall see in Section 5 how semantic changes in the temperature terms in Cantonese were driven by migration from temperate to the current subtropical location.

1.1 Geographical background

All four languages are primarily spoken in places that are often hot and humid.

Lao is the official language of Lao People's Democratic Republic, or "Laos". Laos lies between 14°N and 22.5°N, and ethnic Lao people tend to reside in lower altitudes. The temperature is hot year round (Köppen classification *Aw*: tropical wet and dry). Lao and the Isan language (or "Northeastern Thai") in neighbouring Thailand are essentially variants of

the same language. "Lao" in this paper refers to Standard Lao as spoken in the Laotian capital Vientiane (e.g. Enfield 2007).

The other three languages are primarily spoken in the subtropics (Köppen classification *Cfa* or *Cwa*: humid subtropical), approximately within two degrees either side of the Tropic of Cancer (23.4°N). Speakers of these three languages also tend to live in lower altitudes. (In contrast to, e.g., Hmong-Mien groups, which are also represented in the area, but often live in higher altitudes.)

Southern Zhuang is a collection of dialects which belong to the Central branch of the Tai family, and they are spoken primarily in the southwestern quarter of Guangxi Zhuang Autonomous Region in Southern China. Southern Zhuang is continued across the border in northern Vietnam as the Nùng and Tày languages. "Southern Zhuang" in this paper refers to the Southern Zhuang dialect spoken in Tiandeng County in Guangxi Zhuang Autonomous Region (e.g. Langella 2012).

The Sinitic language of Southern Pinghua is also primarily spoken in Guangxi Zhuang Autonomous Region, and speakers are mainly found along the waterways in the region. Pinghua people are the descendents of some of the earliest Chinese immigrants in the area, and they have a long history of

interactions with the indigenous Zhuang people. Most Southern Pinghua speakers live in rural or suburban areas. "Southern Pinghua" in this paper refers to Southern Pinghua as spoken in the suburb of Weizilu in Nanning, the capital of Guangxi (e.g. de Sousa in prep.).

Cantonese is primarily spoken in neighbouring Guangdong province in Southern China. Standard Cantonese originates in Guangzhou (also known as Canton), the capital of Guangdong. Cantonese has *de facto* official status in Hong Kong and Macau, and there are also many enclaves of Cantonese speakers in Guangxi. Most Pinghua speakers can also speak a local variety of Cantonese and/or Southwestern Mandarin, as most cities and towns in Guangxi are dominated by speakers of Cantonese or Southwestern Mandarin. (Cantonese primarily in Southern Guangxi, and Southwestern Mandarin primarily in Northern Guangxi.) Zhuang people speaking mutually unintelligible Zhuang dialects also tend to communicate with each other using Guangxi Cantonese and/or Mandarin. In many places in Guangxi, speakers of all of these languages live in close proximity. For instance, in Nanning, the capital of Guangxi, traditionally there was a small enclave within the city centre which spoke Southwestern Mandarin. The rest of the city centre speaks Nanning Cantonese. Nearby suburbs and villages

speak Nanning Pinghua, and villages further away speak Northern Zhuang and Southern Zhuang (see de Sousa forthcoming, in prep.). See Figure 1 below for the geographical distribution of the four languages.

Figure 1. Geographical distribution of Lao, Southern Zhuang, Southern Pinghua, Cantonese, and other closely related speech varieties.

One salient temperature-related phenomenon in these languages is their less-developed vocabulary for snow and ice. The vast majority of speakers

of these languages would have never experienced natural sub-zero temperature. (Although the temperature does drop to near zero degrees centigrade occasionally in the lowlands of Guangxi and Guangdong). For instance, unlike the monomorphemic words for 'ice' that probably exist in all European languages, in Lao the word for 'ice' is an analytic compound: *nam*[4] *kòòn*[4] (water lump). The usual word for 'snow' in Lao is a loan from the Indic liturgical language of Pali: *hi*[3]*maq*[1]. Cantonese has monomorphemic native words for ice and snow: *bing*[1] 'ice' and *syut*[3] 'snow'. However, these are words that were inherited from their Chinese ancestors who came from Northern China, where the climate is much colder. Cantonese is known to confuse *syut*[3] 'snow' as 'ice', e.g. *syut*[3] *gou*[1] (snow cake) 'ice cream', *syut*[3] *gwai*[6] (snow cupboard) 'refrigerator', and in older Cantonese *syut*[3] *seoi*[2] (snow water) 'ice water'. (Compare Mandarin *bīng-qílín* (ice-cream), *bīng xiāng* (ice box) 'refrigerator', and *bīng shuǐ* (ice water).) See also Section 5.2 on the Cantonese term 凍 *dung*[3] 'cold' which was historically 'freeze'.

1.2 Linguistic background

The four languages discussed in this paper belong to two language families, Tai and Sinitic. The Tai family is commonly divided into three branches: Southwestern Tai, Central Tai and Northern Tai. Lao belongs to the numerically largest Southwestern branch (which also includes other "big" languages like Thai and Shan), while Southern Zhuang is a collection of diverse Central Tai dialects in Guangxi and the neighbouring eastern tip of Yunnan in Southern China. As can be seen in Section 2 and Section 3, Lao and Southern Zhuang do not share many basic temperature terms. However, cognates of the basic temperature terms in one language can usually be found in the other language.

The Sinitic languages are commonly called "Chinese dialects". Cantonese is the representative member of Yue Chinese. Disregarding the Cantonese enclaves in Guangxi, Southern Pinghua and Yue exist on a dialect continuum, with Standard Cantonese spoken near the eastern end of the continuum and Southern Pinghua spoken at the western end of the continuum. While Southern Pinghua is not easily intelligible to speakers of Standard Cantonese, they are still relatively close to each other, and this can be seen in the forms of the temperature terms in Section 4 and Section 5 on Southern Pinghua and Cantonese, respectively.

There is a long history of direct and indirect mutual influence amongst these languages. Southern Pinghua has an uninterrupted history of interactions with the indigenous Zhuang people, while Cantonese itself also has a strong Tai substratum (Bauer 1996; Li 2002). Historically, Zhuang as a whole has been influenced strongly by Pinghua. Tiandeng County, which is very remote from a Chinese point of view, had very few ethnic Han Chinese people in the past. However, there has been a long history of literacy in Chinese amongst the Zhuang people of Tiandeng County. It is comparatively recent that Standard Mandarin became widely spoken in Tiandeng County, and many Zhuang people from Tiandeng have acquired Guangxi Cantonese and/or Southwestern Mandarin from having lived in other towns and cities in Guangxi. Laos has substantial Chinese communities (mostly Cantonese- or Teochew-speaking) living in the larger cities and towns, and there are some Chinese loanwords in Lao. Going further back in history, there are also many lexical-lookalikes between Proto-Tai and Old or Middle Chinese. A common view in the West is that Tai and Chinese are not genealogically related, and in this paper we will also take this more conservative view[2].

[2] See, e.g., Luo 2008; Blust 2009: 702–707, for overviews and evaluations of the various proposals linking Tai (or

The languages of these two families share many typological similarities. For instance, words are often monosyllabic and there are many lexical tones (five tonemes in Standard Lao, six in Tiandeng Southern Zhuang and Standard Cantonese, and seven in Weizilu Southern Pinghua). The morpheme-per-word ratio is very low (i.e. morphologically 'isolating'). These languages lack inflectional morphology, but have rich derivational morphology. Both Tai and Sinitic languages are primarily SVO. One major difference between these two families is that in Tai languages, most modifiers (including attributive temperature terms) and adjuncts follow the head, whereas in Sinitic languages the vast majority of modifiers and adjuncts precede the head. (The Sinitic languages are typologically highly unusual for being SVO but otherwise very strongly right-headed (Dryer 2003)).

Most of the temperature terms discussed in this paper are what could be called "adjectives". "Adjectives" in general have mostly verb-like morphosyntactic properties in these languages. For instance, they do not

its supranode Kra-Dai), Sinitic and/or Austronesian families. Some linguists are of the opinion that Kra-Dai has a genealogical relationship with the Austronesian language family, e.g. Sagart 2004; Ostapirat 2005.

require a copula when used predicatively, and they take many verbal markers. One could consider "adjectives" in these languages as subclasses of verbs. (See, e.g., Enfield 2007: Section 10 for Lao; Matthews and Yip 1994: Section 9 for Cantonese.) Some of the temperature terms discussed in this paper are causative verbs, or words which can function as either adjectives or causative verbs. For instance, Southern Pinghua *lat*^{3} means 'hot' or 'heat something up'.

When used predicatively, most of these temperature adjectives are one place predicates. Some temperature terms are two-place causative verbs. In Lao, there are other two-place temperature terms which are different from the usual causative verbs. These interesting two-argument constructions in Lao are discussed in Section 2.

The temperature terms in these languages can rarely be used referentially. In Sinitic languages, where the temperature terms are predominantly monosyllabic, there are some literary-sounding disyllabic compounds which can function referentially, e.g. Cantonese *wan*^{1} *nyun*^{5} (slightly_warm warm) 'warmth' as in *taai*^{3}*joeng*^{4} *ge*^{3} *wan*^{1}*nyun*^{5} (sun MOD warmth) 'warmth of the sun'. However, referential use of temperature terms is very rare; when

temperature is referred to, people usually use a temperature adjective and use that to modify another abstract noun.

The temperature adjectives are themselves often modified by other modifiers. However, the modifiability of the temperature adjectives varies, as demonstrated in the sections below. A category of modifier that exists in all four languages is expressives (a.k.a. "ideophones", "mimetics"). Expressives are "marked words that depict sensory imagery" (Dingemanse 2011: 25). Expressives often involve reduplicated forms, and they usually (in Lao and Southern Zhuang) or obligatorily (in Southern Pinghua and Cantonese) co-occur with the semantically related adjective. For instance, in Southern Pinghua there is an adjective *jən*^{1} 'cold', and an expressive form *jən*^{1} *ʧat*^{3}*ʧat*^{3}, which depicts freezing coldness. (The form *ʧat*^{3}*ʧat*^{3} is the expressive-proper; *ʧat*^{3} or *ʧat*^{3}*ʧat*^{3} on their own do not mean anything, and *ʧat*^{3}*ʧat*^{3} is not used with other adjectives.) The ideophones add meaning, including connotations, to the adjectives.

1.3 Other preliminary comments

Data in this paper have been obtained with the help of Koptjevskaja-Tamm's temperature questionnaire (Koptjevskaja-Tamm 2007), with Koptjevskaja-Tamm (2011) and previous works on temperature like Koptjevskaja-Tamm & Rakhilina (2006), and Sutrop (1998, 1999) in mind. Data presented here have been checked with a number of native speakers, and in the case of Cantonese, most data are obtained from the Internet.

The structure of the rest of the paper is as follows. The temperature terms in each of the languages are introduced in each of the following subsections: Lao in Section 2, Southern Zhuang in Section 3, Southern Pinghua in Section 4 and Cantonese in Section 5. Discussions and conclusions are presented in Section 6. In the appendix are brief explanations on the romanisation used for the four languages and historical tone correspondences. The latter is useful in determining the etymology of the temperature terms. The most important point is that both Proto-Tai and Middle Chinese are said to have four tones. The regular tonal correspondences for loanwords between the two proto languages are Proto-Tai tone *A, *B, *C, *D with Middle Chinese tone *A, *C, *B, *D respectively.

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2 Temperature terms in Lao

There are four basic temperature terms in Lao: *hòòn4* 'hot', *qun1* 'warm', *jên3* 'cool' and *naaw3* 'cold'. There is no everyday abstract term for 'temperature' in Lao, apart from the technical term *qunaphuum2*, a word of Indic origin that is used exclusively for stating the temperature in degrees on weather reports. It is not used in everyday speech. The technical word for 'degree' (for measuring temperature) is *qongsaa3*, another Indic term. If people ask about the temperature of something, they will normally ask in terms of 'how hot' or 'how cold' it is. In village life, there is little need for reference to temperature in degrees. The following words have some relation to temperature in their semantics but they are not 'temperature terms' in any sense relevant to this chapter:

(1) *cuut5* = 'to burn (sth.), set fire to[3]'

[3] ABBREVIATIONS: 1 first person, 2 second person, 3 third person, ADVT adversative, BARE bare pronouns (i.e. neither polite nor formal), CLF classifier, CM complement marker, CMPR comparative, COP copula, CS change of state (e.g. perfect or prospective), DEM demonstrative, DEM.GENL general demonstrative, DUR durative, EMP emphatic reduplication, EXP experiential, EXPV expressive (a.k.a. 'ideophone', 'mimetic'), FAM

dang3 = 'to start a fire'

maj5 = 'to burn (intr.), to be burnt'

daat5 = 'to singe, score; to touch something hot'

This section concentrates on a small set of four words in Lao that denote the pure notion of temperature.

2.1 Four basic temperature terms and their etymologies

The four basic temperature terms in Lao are reflexes of temperature terms reconstructed for proto Southwestern Tai (and also for proto Tai, except for *hòòn4* 'hot')[4]:

(2) *hòòn4* = 'hot'

Approximate phonetics: [hɔːn^{51}]

---

familiar, FP final particle, IMP imperative, IRR irrealis, MASS mass classifier, MOD modifier marker, NEG negative, NMLZ nominalizer, PASS passive, PL plural, POL polite, PROX proximal, Q question, REDUP reduplication, SG singular, TOP topic

[4] Li = Li 1977; Luo = Luo 1997, Jonsson = Jonsson 1991; PSW = Proto Southwestern Tai; PT = Proto Tai; A1, C4 etc. are historical tonal categories. Data obtained with the help of Proto-Tai'o'matic: sealang.net/crcl/proto/.

Etymology: Proto Southwestern Tai *rɔn 'hot'

Luo**:** 'hot (of weather)'

Jonsson**:** [*r- (*C4*) *B67-16*] PSW: *rɔn 'hot'

(3) *qun1* = 'warm'

Approximate phonetics: [ʔʊn^{44}]

Etymology: Proto Southwestern Tai *ʔun 'warm, to warm'

Jonsson**:** [*?- (*B3*) *B101-18*] PSW: *?un 'warm, to warm'

Li**:** [*?- (*B1*) *13.1:243* (rule 14.5.7)] PSW: *?un PT: **?ion

[Look-alike of Middle Chinese 溫 *ʔwʌn^{A} 'lukewarm', but the tones do not match.]

(4) *jên3* = 'cool'

Approximate phonetics: [jen^{13}]

Etymology: Proto Southwestern Tai *ʔjen 'cool'

Jonsson**:** [*j- (*A4*) *B52-9*] PSW: *jen 'cool'

Li**:** [*?j- (*A1*) *9.9:181* (rule 14.6)] PSW: *?jen PT: *?jen

(5) *naaw3* = 'cold'

Approximate phonetics: [na:w^{13}]

Etymology: Proto Southwestern Tai *hnaau 'cold'

Jonsson**:** [*hn- (*A1*) *B42-21*] PSW: *hnaaw 'cold'

Li**:** [*hn- (*A1*) *6.6:113* (rule 16.14)] PSW: *hnaau PT: *hnau

2.2 Semantico-grammatical properties of the temperature terms

2.2.1 Semantic parameters of the Lao four-term system

As a semantic system, the four terms can be grouped into pairs on the two dimensions high versus low and mild versus extreme, analogous to the structure of the English set *hot, cold, warm, cool*, as shown here:

	MILD	EXTREME
HIGH		
▲	*qun1*	*hòòn4*
▼	*jên3*	*naaw3*

LOW

Figure 2. Semantic parameters of the Lao temperature term system

Like in the English distinctions *hot/warm* and *cold/cool*, the strong terms often imply that the temperature is bad or undesired, while the mild terms imply good, desired. This is not entailed, however. If the context lends itself to the opposite reading, there is no pragmatic or semantic clash.

2.2.2 Grammatical properties of the terms, in relation to meaning

The four Lao temperature terms have certain semantico-grammatical properties in common, with a couple of discrepancies. These are listed in Table 1.

Table 1. Semantico-grammatical properties of the Lao temperature terms

	hòòn4	***qun1***	***naaw3***	***jên3***
1. refers to gradable state?	yes	yes	yes	yes
2. tactile (temp of something one touches)?	yes	yes	yes	yes

3. internal (how one feels inside)?	yes	yes	yes	yes
4. has adjective grammatical properties?	yes	yes	yes	yes
5. occurs in non-agentive causative construction?	yes	yes	yes	yes
6. occurs in agentive causative construction?	no	**yes**	no	no
7. occurs in external possessor construction?	yes	yes	yes	yes
8. extends into state of mind, nature of situation?	yes	yes	**no**	yes

In terms of their semantics, they all refer to a gradable state (point 1 in Table 1) that abstractly picks out a temperature, with reference to some vaguely defined neutral or average temperature. (There is no term for 'lukewarm' or 'room temperature'.) There is no lexicalised distinction in Lao between 'tactile' and 'non-tactile' temperature (points 2 and 3 in Table 1). They all can be used to refer both to the externally detectable temperature of a thing (e.g., as when one touches a pipe, or another person's skin), and to the internal sensation of 'feeling' that temperature (e.g., as when one feels cold on a winter's day). There is no grammatical distinction between these (by contrast with a language like Dutch: *Hij is koud* 'He is cold', uttered when he is dead and I am touching his skin, versus *Hij heeft*

het koud 'He is cold', literally 'He has it cold', meaning he feels cold, uttered when the weather is cold and I see him shivering):

(6) *man2* *naaw3*
3SG.BARE cold
'He is cold.' (e.g., He is dead and I am touching his skin, or the weather is cold and I see him shivering.)

In terms of their form class status, the four terms are all adjectives (point 4 in Table 1), according to the standard tests for that sub-class of verbs (Enfield 2007: 248ff). One point of difference between them concerns inchoative marking, which is done by adding one of the four directional verbs—*khaw5* 'enter', *qòòk5* 'exit', *khùn5* 'ascend', and *long2* 'descend'—after the adjective to express the meaning that the adjective property becomes 'more' (Enfield 2007: 259–260). Verbs in Lao differ as to which inchoative complement can be used. Often more than one is possible. As Table 2 shows, all of the temperature terms can take *khaw5* 'enter' and *khùn5* 'ascend', while only the 'low' temperature terms can occur with

long2 ‘descend’. None of the temperature terms takes *qòòk5* ‘exit, issue forth’:

Table 2. Lao temperature terms and directional-verb inchoative complements

	khùn5 ‘ascend’	long2 ‘descend’	khaw5 ‘enter’	qòòk5 ‘exit’
hòòn4	✔	✘	✔	✘
qun1	✔	✘	✔	✘
jên3	✔	✔	✔	✘
naaw3	✔	✔	✔	✘

In terms of the argument structure possibilities for the four terms, they can all be used to express a property of something, where that thing is the single argument of the verb. There are various ways in which they can appear with two arguments. Only *qun1* appears normally with an agentive causative meaning 'to warm something up' (point 6 in Table 1).

(7) *kuu3 tòòng4 qun1 cak2 kòòn1*

1SG.BARE must warm engine first

'I have to warm the engine up first.'

This is not possible using any of the other three terms. However, all four terms can be used in a *non-agentive* causative construction (Enfield 2007: 280ff), in which the subject is an effector and the object is a theme, something that is caused to become a certain temperature (point 5 in Table 1):

(8) *thòò1 nii4 hòòn4 mùù2*

pipe DEM.GENL hot hand

'This pipe is hot to the touch.' or 'This pipe makes the hands hot.'

The other three verbs are grammatical with this construction, given an appropriate context.

Another type of two-argument construction also has causal semantics but with a different mapping of semantic role to grammatical relation; here the subject is a theme, and the object is an effector:

(9) *nam4 nii4 hòòn4 dèèt5*

water DEM.GENL hot sunshine

'This water is hot from/because of the sunshine.'

Again, the other three verbs are grammatical with this construction, given an appropriate context.

A third type of two-argument construction expresses external possession (Enfield 2007: 94; point 7 in Table 1). In this construction, the subject is a person and the object is a possessed body part in which the person feels the temperature sensation:

(7) *kuu3 jên3 tiin3*

1SG.BARE cool foot

'My feet are cool' or 'I am cool in the feet'

And again, the other three verbs are grammatical with this construction, given an appropriate context.

Finally, three of the four terms, with the exception of *naaw3* 'cold', are used in semantic extensions that relate to state of mind or nature of a

situation. In the following example, *jên3* 'cool' denotes a person's temperament:

(8) *man2* *caj3* *jên3*
3SG.BARE heart cool
'He's cool-headed, patient.'

Here, similarly, *hòòn4* 'hot' denotes a person's temperament:

(12) *man2* *caj3* *hòòn4*
3SG.BARE heart hot
'He's hot-headed, impatient.'

In the following example, *qun1* 'warm' denotes the 'atmosphere' of an event:

(9) *ngaan2-liang4* *mii2* *khuam2* *qop2-qun1* *laaj3*
event-feed have NMLZ bake-warm much
'The party was hospitable, pleasant, had a 'warm' atmosphere.'

2.3 Expressives

It is worth noting in brief that in Lao there is a word class of expressives (a.k.a. 'ideophones', 'mimetics'; Enfield 2007: 299ff), and a few of these specifically refer to temperature. Here are some examples:

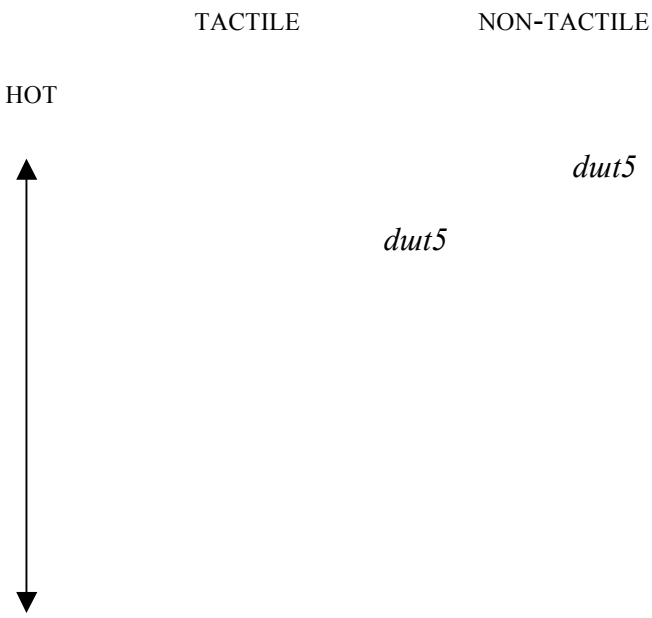
(10)	*qun1 cuu1-luu1* 'toasty'	(*qun1* 'warm')
	hòòn4 cuu1-luu1	(*hòòn4* 'hot')
	*(*naaw3, *jên3) cuu1-luu1*	
(11)	*naaw3 còòj4-còòj4* 'cold in the bones'	(*naaw3* 'cold')
	jên3 còòj4-còòj4	(*jên3* 'cool')
	*(*hòòn4, *qun1) còòj4-còòj4*	
(12)	*hòòn4 vùùt5-vùùt5* 'extremely hot, will burn you'	(*hòòn4* 'hot')
	*(*qun1, *naaw3, *jên3) vùùt5-vùùt5*	

In each case, the expressive adds specific nuances of meaning to the

temperature term, with each expressive often appropriate to particular, recurring communicative circumstances. While the precise meaning and usage of expressives is very difficult to capture (Dingemanse 2012), these meanings can be hinted at with semantically specific expressions such as 'toasty' or 'cold in the bones', given above.

3 Temperature terms in Southern Zhuang

The core of the linguistic temperature system of Southern Zhuang is made up of four terms. As Figure 3 shows, the system is sensitive to the opposition between the domains of TACTILE vs. NON-TACTILE temperature. Each domain follows its own temperature scale, although the two basic terms *dut5* 'hot' and *tot5* 'cold' are found across the TACTILE/NON-TACTILE divide.



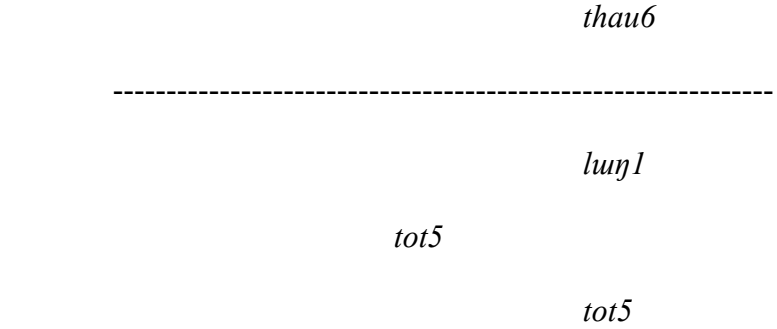
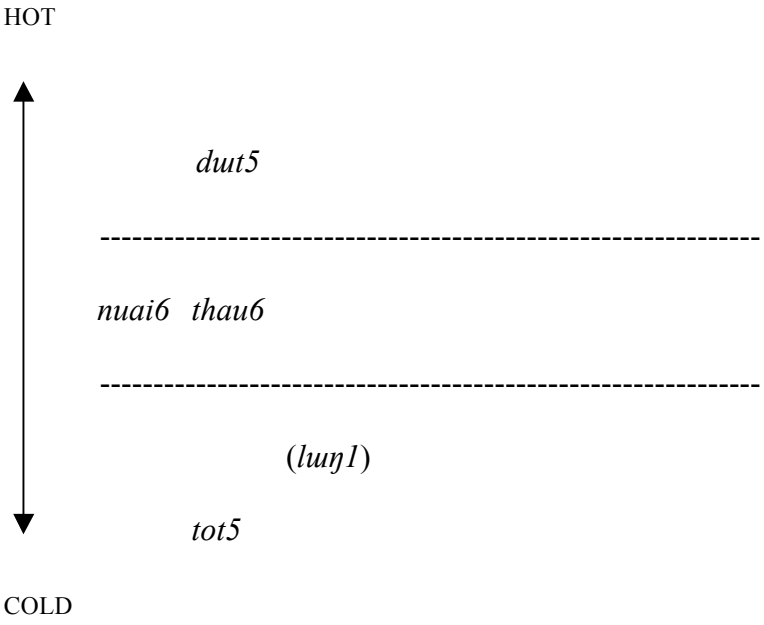


Figure. 3. Basic structure of the temperature system in Southern Zhuang

Furthermore, lexical evidence points at the existence of two additional sub-systems. Firstly, in the TACTILE domain, water and, to a lesser extent, food, enjoy a special status (Figure 4a). NEUTRAL *nuai6* and otherwise NON-TACTILE *thau6* 'warm' and *luŋ1* 'cool' allow for finer-grained descriptive potential (see Section 3.2.2). Secondly, in the NON-TACTILE domain, the optional terms *daaŋ6* 'cold' and *kat4* 'very cold' establish a distinction between AMBIENT TEMPERATURE and PERSONAL FEELING TEMPERATURE in the area covered by NON-TACTILE *tot5* '(unpleasantly) cold', to which Figure 4b "zooms in" (see Section 3.3.2).

a. TACTILE DOMAIN: Water (and food) sub-system



b. NON-TACTILE DOMAIN: (Unpleasantly) cold temperatures sub-system

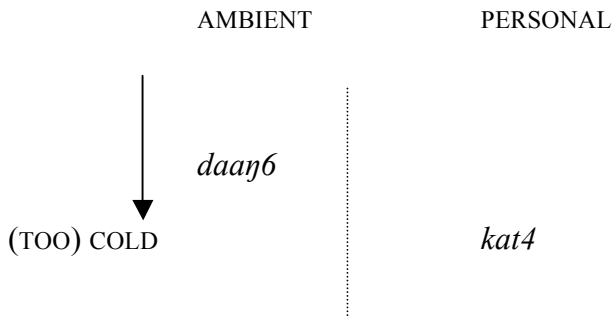


Figure 4. Sub-systems in the linguistic temperature system of Southern Zhuang

Section 3.1 reviews the possible etymologies of the Southern Zhuang temperature terms. Section 3.2 examines the TACTILE domain, and Section 3.3 the NON-TACTILE domain.

3.1 Origins of the Southern Zhuang temperature terms

The two warming terms are clearly of Tai origin. *Dut5* 'hot' is well-attested throughout the Tai language family, although sometimes meaning 'boil (intr.)' in other Tai languages (e.g. Standard Thai เดือด *duat2* 'boil (intr.)', Proto-Tai **ɗɤːt^{D}* 'boil (intr.)).[5] Southern Pinghua *lat^{3}* 'tactile hot' (Section 4.1) and Cantonese *naat^{3}* 'painfully tactile hot' (Section 5.1) are perhaps also related etymologically. *Thau6* is an easily recognisable reflex from

[5] Lao has a lesser-used term for 'boil (intr.)': *dùat5* (as in *dùat5-hòòn4* 'very dramatic, dangerous, big trouble'), which is perhaps etymologically different from *daat5* 'singe' described in Section 2. Another complication is that Northern Tai languages like Yay and Saek have *data* meaning 'boil (intr.)' (Pittayaporn 2009: 355), and Southern Pinghua and Cantonese also had strong contacts with Northern Tai languages.

Proto-Tai **thrau*^{B} ‘warm’ (Li 1977: 121). Cognates exist in the two other branches of the Tai family; cf. Bouyei (Northern Tai) *lau* (Li 1977: 121), Standard Thai (Southwestern Tai) เร่า *raw3*, in the compound *raw3rɔɔn4* ‘to be impatient; to be sexy, ‘hot’ (describing a girl)’.

The etymology of COOLING temperature terms is more difficult to pin down. Zhang et al.’s lexical survey of Zhuang languages (1999: 778) does not mention *tot5* ‘cold’ for the dialects spoken in the Tiandeng area. However, it does list under the heading ‘cold (water)’ phonetically similar forms used in localities both north and south of Tiandeng in Western Guangxi: *tɛot7*, *tɛɔ:t7, kjot7* for the Northern Zhuang dialects spoken in the Baise area, located along the boundary between Northern and Southern Zhuang, and *to:t9* for the Southern Zhuang dialect of the Shangsi county. Li (1977: 221–23) lists similar forms for Northern Tai dialects, for example Po-ai *čɔt* and Dioi *kiot.* He treats these forms as reflexes of Proto-Tai **klat*^{D}*,* from which *tot5* ‘cold’ may thus also possibly derive.

A cursory look at words for ‘cold’ in Southwestern Tai and Central Tai languages reveals a profusion of potentially cognate forms of *kat4* ‘very cold’: Lü (Southwestern Tai) *kăt* ‘cold’, Tho (Central Tai) *kat* ‘cool, cold’, Longzhou Southern Zhuang *kat* ‘cold (water)’ (Li 1977: 223), and also

kat7~kjat7 'cold (water)' (Zhang et al. 1999: 778) for several Southern Zhuang dialects spoken in the vicinity of Tiandeng. All are treated by Li as reflexes of Proto-Tai **klat*^{D}, already evoked above as a possible root for *tot5*. However, the evolution from **klat*^{D} to *kat* remains unusual in the sense that the Proto-Tai **kl-* generally gives /kj-/ in CT dialects (Li 1977: 220, Pittayaporn 2009: 148), as in Southern Zhuang *kjaŋ6* 'middle' from Proto-Tai *klaːŋ^{A} (Pittayaporn 2009: 149). Another scenario may help explain this. It could well be that NON-TACTILE *kat4* semantically derives from homophonous *kat4* 'to bite'. This would also help account for the fact that within the NON-TACTILE domain, *kat4* specifically describes PERSONAL FEELING TEMPERATURE, generally modifying body part terms.

Luŋ1 'cool' is most probably of Sinitic origin: 凉 (Middle Chinese tone *A, as in Mandarin Chinese 凉快 *liáng kuài* 'cool down, pleasantly cold'; Southern Pinghua 凉 *lɛŋ*^{4} 'cool' (Section 4.2), Cantonese 凉 *loeŋ*^{4} 'cool' (Section 5.2)); *luŋ1* follows Proto-Tai tone *A, which corresponds to the Middle Chinese tone *A.

It remains unclear whether *daaŋ6* 'cold' is of Tai origin. It could possibly derive from 冷 e.g. Mandarin Chinese 冷 *lěng* 'cold', Cantonese 冷 *laang*^{5} 'cold' (Section 5). The tones do match: Proto-Tai *C for *daaŋ6* to the Middle Chinese tone *B for 冷 (Tai tone *C corresponds to Chinese tone *B). The initial consonants also seem to correspond; cf. Proto-Tai **dɤ̀ːt* 'boil (intr.)' that gives Southern Pinghua *lat*^{3} 'hot' (see Section 4.1). In any case, its use is geographically restricted to the area lying along the border with Vietnam, from Chongzuo to Debao (Zhang et al. 1999: 778).

As for the origin of the NEUTRAL temperature term *nuai6,* it remains obscure.

To mention in passing, Southern Zhuang has recently acquired a 'freeze'-verb, *toŋ3* (<Mandarin Chinese 凍 *dòng* 'freeze (intr.)'). Only younger speakers use it, as a NON-TACTILE temperature term describing an extremely cold temperature.

3.2 Tactile temperature terms

3.2.1 The basic terms dut5 'hot' and tot5 'cold' as TACTILE adjectives

As TACTILE TEMPERATURE terms, *dut5* 'hot' and *tot5* 'cold' make up a symmetrical system, covering the whole range of WARMING and COOLING temperature values, respectively. In contrast with their NON-TACTILE counterpart (see Section 3.3.1), they do not carry any pronounced connotation, and thus exhibit a higher degree of versatility, as shown in (17) and (18). In both examples *dut5* 'hot' occurs in a similar syntactic environment, acting as the main predicate, and similarly qualifies food. Depending on the context, it may refer to a desirable temperature (17), or to an excessively hot temperature (18).

(13) *khjak4* *ɲaŋ1* *dut5* | *ni2* *kin4* *nau5*
vegetable still hot 2 ingest Q.POL
'The vegetables are still hot, do you want to eat some?'

(14) *boŋ6* *ɲaŋ1* *dut5* | *tha4* *bat5=to1*
cooked.rice still hot | wait moment=one
'The rice is still hot, wait a moment.'
<warning a child against burning himself>

The temperature conventionally associated to the qualified entity also affects the actual temperature values signified by *dut5* 'hot' and *tot5* 'cold'. Thus, *nam3 tot5* 'cold water' is colder, in physical terms, than food purportedly consumed *tot5,* such as *boŋ6 θaau4* 'rice soup', which is often consumed cool during the hot season. In (19), *boŋ6 θaau4* 'rice soup' is the referent of the omitted object argument qualified by the adjective *tot5* 'cold', functioning here as a secondary predicate.

(19) *lau1 cəu2 kin4 tot5 loŋ1 pai4*
1 IRR ingest cold descend go
'We eat (the rice soup) cold.'

Besides context, degree intensification quite obviously contributes to modulate the meaning of *dut5* 'hot' and *tot5* 'cold'. The two main intensification devices are degree words and reduplication. An example of a degree word is the adjective *laai4* 'very, too', which when modifying *dut5* or *tot5* clearly indicates an excessive and potentially dangerous temperature.

(20) *nam3 caŋ1 kwən6 | ti4 dut5 laai4*

water not.yet boil 3 hot very

'(Even as) the water is not yet boiling, it (i.e. the electric stove) is (already) very hot!'

Reduplication comes in two types. In the REDUP type (21), the first element retains its tonal value but vowel length contrast is neutralised. It is close in meaning to English 'really X'. The EMP.REDUP (22) produces a markedly emphatic effect. The first element features an extra long vowel and is pronounced in a very high pitch (transcribed as HP), while both tonal value (transcribed as 0) and vowel length contrast are neutralised in the second element. Note that although the reduplicated forms refer to warmer/colder temperatures than the non-reduplicated ones, they do not necessarily convey the negative connotation of *laai4*. In other terms, only the physical temperature is affected by the intensification process, but not the connotation, which remains assigned by the context.

(21) *ti4 ɲaŋ1 koi2 au1 thin4 dut5~dut5 ma1 liŋ6 khen4*

3 still then take stone REDUP~hot come rub arms

'He then took really hot stones and rubbed my arms (with them).'

(22) *θei1 dɯt5 | ʔap5 nam3 to:tHPtot0~tot5 cəɯ2 su1fu1*
time hot bathe water EMP.REDUP~cold COP comfortable
'When it's hot, it feels good to bathe in very very cold water.'

3.2.2 Water (and food): evidence for a sub-system

Within the TACTILE domain, the use of otherwise NON-TACTILE *luŋ1* 'cool' and *thau6* 'warm', as well as of the neutral temperature term *nuai6* 'lukewarm' attests to the existence of a sub-system restricted to the temperature evaluation of water, and to a lesser extent, of food.

Neutral *nuai6* 'lukewarm' signifies a temperature that triggers no particular temperature sensation, whether physically or affectively. Drinking water or the water of a canal can both be described as *nam3 nuai6* (water lukewarm). It equally applies to food, as long as it has been cooked: *boŋ6* 'cooked.rice' can be *nuai6*, but **khau6 nuai6* (uncooked.rice lukewarm) is incorrect. Note that similarly to NEUTRAL terms in some other languages, such as French *tiède* 'lukewarm', entities described as *nuai6* must retain a little bit of warmth, hence the ability to say *boŋ6 ɲaŋ1 nuai6* 'the rice is still

lukewarm'. Rice which has completely cooled down would rather be described as *tot5* 'cold'.

Nuai6 'lukewarm' and TACTILE *thau6* 'warm' cover the same range of temperature values: both can be described as *nau5 tot5 nau5 dut5* 'neither cold nor hot'. *Thau6* 'warm' also shares the same combinatory possibilities as *nuai6: kin4 nam3 thau6* 'to drink lukewarm water', *nam3 muŋ4 thau6* 'the water of the canal is lukewarm', *boŋ4 ɲaŋ1 thau6* 'the rice is still lukewarm'. However *nuai6* is emotionally neutral, whereas *thau6* carries an affective, and indeed positive, connotation.

Thau6 can also be used as a transitive verb meaning 'to warm', as in (23).

(23) *boŋ6 ni1 | ni2 an1.θei1 nau5 thau6 | ni2 tu1 kin4*
rice TOP 2 sometimes NEG warm 2 also ingest
'Sometimes you don't warm the rice, (but) you eat it all the same.'

In comparison to *nuai6* 'lukewarm' and *thau6* 'warm', *luŋ1* 'cool' is more restricted insofar as food cannot readily be described as *luŋ1*, unless it is customarily consumed cool. While *boŋ1 ʔaam1* 'plain rice' cannot take

luŋ1 'cool' as a modifier, *boŋ1 θaau4* 'rice soup', which is appreciated cool during the hot season, can. *Luŋ1* could therefore be substituted for *tot5* 'cold' in (19), as shown in (24), without affecting the evaluation of the actual temperature of the rice soup, but suggesting a pleasantly cool temperature. The moderate temperature range of TACTILE *luŋ1* 'cool' is thus included in that of TACTILE *tot5* 'cold'.

(24) *lau1* *cəu2* *kin4* *luŋ1* *loŋ1* *pai4*
1 IRR ingest cool descend go
'We eat (the rice soup) cool.'

Additionally, *luŋ1* 'cool' is frequently used without the restriction mentioned in the above paragraph in the analytic causative construction involving *hau6* 'GIVE': *hau6 X luŋ1* (GIVE X cool) 'cool something down, let something cool down'. Unlike *thau6* 'warm', *luŋ1* 'cool' cannot be used transitively on its own.

As noted above, *luŋ1* 'cool' and *thau6* 'warm' retain a markedly positive connotation, in contrast with TACTILE *dut5* 'hot' and *tot5* 'cold' and *nuai6* 'lukewarm'. We will see in the next section that the semantic opposition

between 'pleasant' versus 'unpleasant' temperatures is central in distinguishing the NON-TACTILE terms. It seems reasonable to assume that the use of *thau6* 'lukewarm' and *luŋ1* 'cool' with water and food derives from, or at least relates to the NON-TACTILE domain. The temperature of the food and of the water we consume, and even more so of the water we bathe in, indeed commonly have an effect on our body temperature sensation.

3.3 Non-tactile temperature terms

3.3.1 Thau6/luŋ1 vs. dut5/tot5: 'pleasant' vs. 'unpleasant' temperatures

Disregarding optional terms, treated in Section 3.3.2, four terms occupy the NON-TACTILE domain: *dut5* 'hot' and *thau6* 'warm' for WARMING temperatures, and *tot5* 'cold' and *luŋ1* 'cool' for COOLING temperatures. Unlike their TACTILE counterparts, all four terms have a specific connotation. With regards to the dimension TEMPERATURE VALUE, the opposition 'pleasant' versus 'unpleasant' temperatures is crucial to understanding the meaning of each term. On the one hand, *thau6* 'warm' and *luŋ1* 'cool' both describe a comfortable temperature, or the pleasant

bodily sensation associated with it. On the other hand, *dut5* 'hot' and *tot5* 'cold' evoke excessive temperatures, too hot or too cold to feel comfortable. Example (25) thus conveys the speaker's feeling that it's too hot to stay in the sun. If *thau6* 'warm' were used instead of *dut5* 'hot', (25) could possibly refer to a sunny winter day when one enjoys the heat provided by the sun.

(25) *jou5* *det5* *cəu2* *dut5*
be sunshine IRR hot
'It's too hot to stay in the sun.'

The four terms generally apply to the whole NON-TACTILE domain. All the terms can take a human experiencer subject. Days, places, or the weather can be described using any of them. Tiandeng is described as *thau6* in (26), i.e. it is a temperate place (in comparison to, e.g., Beijing).

(15) *tei2* *kin3* *cəu2* *tei2* *thau6* | *nau5* *tot5* *ka3lau1*
place PROX.DEM COP place warm NEG cold much
'This place is a temperate place, it is not very cold.'

Even when the distinction between AMBIENT TEMPERATURE and PERSONAL FEELING TEMPERATURE is not lexically borne out, it is nonetheless possible to categorise constructions according to the distinction between the two sub-domains. In absence of any overt argument, simple predications are unmarked. Example (25) could alternatively be translated to 'I am too hot to stay in the sun'. There is no specific construction dedicated to the expression of AMBIENT TEMPERATURE. Nonetheless, all the constructions described below specifically express PERSONAL FEELING TEMPERATURE.

In (27), *tot5* 'cold' is the complement of the verb *han4* 'to see', which also means 'to think (that), to feel'.

(16) *lau1 han4 tot5 jəi2*
1 feel cold FP
'I feel rather cold.'

In (28), the temperature term also fills the complement slot. It is difficult to effectively render into English the construction *jou5* + temperature term. French *être au chaud* ('be at heat') and *être au frais* ('be at cold') provide a

close match, although they take a human experiencer subject while in Southern Zhuang body part terms are made the locus of temperature sensation.

(17) *tooŋ3* *jou5* *thau6*
belly be.at warm
'I feel warm.'

Still expressing PERSONAL FEELING temperature, *thau6* 'warm' and *luŋ6* 'cool' can occur as complements to the verb *ʔau1* 'to take', as in *ʔau1 luŋ1* 'to cool down' and *ʔau1 thau6* 'to warm up'. *Dut5* and *tot5* logically sound unnatural in this environment, since they do not express desirable temperatures. *Thau6* can also be used transitively, either with an object argument (as in 29) or without one (as in 30).

(29) *thau6* *məu1* *lok2eŋ1*
warm hand child
'(to) warm (the) child's hands'

(18) *khau6 lun1 ma1 thau6 bat5=to1*

enter house come warm.up moment=one

'Come in warm up for a moment!'

Additionally, sources of heat can also be modified by *thau6* 'warm', which in this use does not describe their intrinsic temperature but their property of making people feel warm. In keeping with the comments made about evaluation of food temperature in Section 3.2.2, *luŋ1* could also be used in (32) (although not of course in combination with *ho4ko4* 'hotpot'), whereas the adjective *baaŋ1* 'thin' would be the correct alternative to *thau6* in (31).

(19) *mei1 pha6 phən4 nok1 thau6 nau5*

have blanket CLF CMPR warm Q.POL

'Do you have a warmer blanket?'

(20) *kin4 ho4ko4 nok1 thau6*

ingest hotpot CMPR warm

'Eating hotpot makes you feel warmer (than eating fried dishes).'

To conclude this section, a few remarks can be made about degree intensification. The four terms can be reduplicated, but only *dut5* 'hot' and *tot5* 'cold' can take the adjective *laai4* as degree intensifier. *Laai4* 'very, too' denotes an 'excess of' that is incompatible with the moderate temperature values described by *thau6* 'warm' and *luŋ1* 'cool', and, for that matter, of the neutral TACTILE term *nuai6* 'lukewarm'. Beyond usual intensification devices, expressive forms help in making fine semantic refinements beyond the temperature terms' regular meaning. The form *jom6-jom6* best illustrates this. It is used only within the NON-TACTILE domain, in combination with both *thau6* 'warm' and *dut5* 'hot'. It adds a sense of being enveloped by warmth or heat. With *thau6,* it intensifies the pleasant feeling that one could experience while diving under a warm blanket during a cold night. With *dut5*, it can refer for example to the suffocating weather preceding a tropical storm. A list of expressive forms is provided in (33). Contrarily to the reduplicated variants of the NON-TACTILE temperature terms, they accentuate the positive or negative connotation of their host term. Note that expressive forms are bound to the preceding

adjective, in the sense that they cannot occur on their own. They also always occur in reduplicated form.

(21) a. *dut5 jaŋ2-jaŋ2, dut5 jom6-jom6* (*dut5* 'hot')

b. *thau6 jom6-jom6* (*thau6* 'warm')

c. *luŋ1 phjai5-phjai5* (*luŋ1* 'cool')

d. *tot5 cit4-cit4* (*tot5* 'cold')

e. *daaŋ6 cit4-cit4* (*daaŋ6* 'unpleasantly cold')

3.3.2 Optional daaŋ6 and kat5: is the NON-TACTILE domain monolithic?

It was argued that the opposition between the AMBIENT and the PERSONAL FEELING domains was not involved in the semantics of the four terms discussed in Section 3.3.1. In the case of the optional adjectives *kat4* and *daaŋ6*, it appears that it does bear some relevance. Indeed, a first dimension of contrast between *kat4* 'very cold' and *daaŋ6* 'cold' involves a parameter of KINDS OF TEMPERATURE EVALUATION. *Kat4* typically combines with body part terms, most commonly in reduplicated form: *kha4 kat4-kat4* ('leg REDUP-cold') 'My legs feel really cold', *tooŋ3 kat4-kat4* ('belly REDUP-cold') 'My belly feels really cold'. In contrast, it cannot modify external

entities such as *tei2* 'place', *fa3* 'sky, weather', or *θei1* 'time'. The distribution of *daaŋ6* is complementary to that of *kat4*: **kha4 daaŋ6* ('leg cold') is impossible but *tei2 daaŋ6* 'cold place', *fa3 daaŋ6* 'cold weather' and *θei1 daaŋ6* 'cold time, when it is cold' are appropriate.

However, the divide between PERSONAL FEELING TEMPERATURE and AMBIENT TEMPERATURE is not as firmly established as the preceding comments might suggest. On the one hand, *kat4* 'very cold' emphasises the painful bodily sensation resulting from low external temperature only, and is thus not appropriate to describe the sensation of cold associated with sickness or resulting from the ingestion of, say, very cold water. On the other hand, *daaŋ6* does routinely occur as a main verb possibly predicating a temperature sensation of an experiencer subject. In the absence of any overt subject, both interpretations are possible in (34). Example (35) overtly refers to a human experiencer, the addressee, and is perfectly acceptable.

(34) *hən4* *daaŋ6*
very cold
'(It's) very cold/(I am) very cold.'

(22) *pən2 mau1 daaŋ6 pə5*

now 2FAM cold Q.POL

'You're cold now?'

Predictably, the degree of acceptability of *daaŋ6* gradually drops as the construction makes the reference to PERSONAL FEELING TEMPERATURE more explicit, due to the aforementioned impossible collocations with body part terms. The following are constructed examples, in which I substituted *daaŋ6* for another temperature term originally used by the speaker. Example (36), adapted from example (27), was not readily accepted by all speakers. Example (37), which makes explicit reference to the body, was unanimously rejected.

(23)? *lau1 han4 daaŋ6 jei2*

1 feel cold FP

'I feel cold.'

(24)* *taŋ1 kən1 jou5 daaŋ6*

whole person be.at cold

'(Her) whole body felt cold'

We now say a few words on the range of temperature values covered by *kat4* 'very cold' and *daaŋ6* 'cold', respectively to that of *tot5* 'cold'. *Kat4* markedly connotes very low external temperatures, low enough to cause much physical discomfort. However, there is no point between *tot5* 'cold' and *kat4* 'very cold' that would form a clear-cut boundary such as that separating *tot5* 'cold' from *luŋ1* 'cool'. Rather, *kat4*'s temperature range is included in that of *tot5,* in the same way as Swedish *het* 'hot' covers a range included in that of *varm* 'warm' (Koptjevskaja-Tamm & Rakhilina 2006). In contrast, the temperature range covered by *daaŋ6* is coextensive to that of *tot5*. This seems to be borne out in the intensification patterns of the three terms *tot5, kat4* and *daaŋ6:* whereas *tot5* and *daaŋ6* share the same intensification patterns, including the expressive form *cit4-cit4* (38), *kat4*'s intensification possibilities are limited to reduplication (39).[6]

[6] The fact that there is no expressive form for *kat4* might not be *per se* very revealing. Gaps are indeed not unusual in expressive paradigms. Alternatively, it can lend further credit to the hypothesis that *kat4* 'very cold' semantically derives from *kat4* '(to) bite' (see Section 3.1.).

(25) Degree word *daaŋ6 laai4* *tot5 laai4* 'too cold'

REDUP *daŋ6~daaŋ6* *tot5~tot5* 'really cold'

EMP.REDUP *daa:ŋHPdaŋ0~daaŋ6* *to:t1tot0~tot5* 'very very cold'

Expressive *daaŋ6 cit4~cit4* *tot5 cit4~cit4* 'very cold'

(39) REDUP *kat4~kat4* 'really cold'

EMP.REDUP *ka:tHPkat0~kat4* 'very very cold'

Finally, it is important to stress that *tot5* 'cold', particularly with the help of intensifiers, covers all the contexts of use of *daaŋ6* 'cold' and *kat4* 'very cold'. These two adjectives can thus be considered optional temperature terms, but for different reasons. Similarly to Southern Pinghua *hɐŋ*$^{3'}$ 'too hot' and *pən*^{1} 'ice', *kat4* 'very cold' is optional by virtue of its temperature range, covered by *tot5* 'cold'. In the case of *daaŋ6* 'cold', it is its domain applicability that is subsumed under that of the more general *tot5* 'cold'.

4 Temperature terms in Southern Pinghua

The basic temperature terms in Southern Pinghua divide the temperature spectrum into four (largely non-overlapping) temperature values. With "hot", there is also a tactility distinction. The following are the five basic temperature terms in Southern Pinghua: ○ *lat*^{3} 'tactile hot', 熱 *ɲit*^{5} 'non-tactile hot', 暖 *nun*^{5} 'warm', 凉 *lɛŋ*^{4} 'cool', ○ *jən*^{1} 'cold'. A ○ here indicates that the etymon is disputed. Pinghua is rarely written; writing is usually done in Written Chinese, i.e. Written Mandarin. When a cognate does not exist in Mandarin, people do not know how a word is to be written, and they may use *ad hoc* ways to represent that word (e.g. use a homophonous character, make a new character up). This is the case with *lat*^{3} 'tactile hot' and *jən*^{1} 'cold'. Being represented by a ○ here does not mean that people consider the word a loanword.

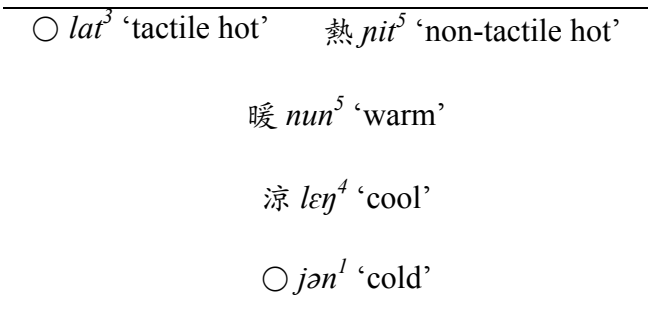


Figure 5. The basic temperature adjectives in Southern Pinghua.

With the exception of 暖 *nun*^{5} 'warm' which is not easily modified by 'too much' (see Section 4.1 below), all of these can be modified by degree modifiers like *kəi*^{2} X 'quite X', *hau*^{2} X 'very X', X~X *təi*^{6} 'kind of X', *jəu*^{5} *tɪk*^{3} X 'a little bit X' and various ways of saying 'too X' like *t*^{h}*ai*$^{3'}$ X, X *tɔ*^{1}, *t*^{h}*ai*$^{3'}$ X *tɔ*^{1}, X *nɐm*$^{3'}$, X *nɐm*$^{3'}$ X. Most of these adjectives also have expressive forms. (In Sinitic languages, the expressive proper is bound to the preceding, or sometimes following adjective.) While *nun*^{5}*-jʊŋ*^{4}*jʊŋ*^{4} 'warm' and *tʃɐn*^{6}*tʃɐn*^{6}*-lɛŋ*^{4} 'cool' have pleasant connotations, *ɲit*^{5}*-lat*^{5}*lat*^{5} 'hot'; and *jən*^{1}*-tʃat*^{3}*tʃat*^{3} 'cold' have unpleasant connotations.

In addition, there are other semantically narrower temperature terms: ○ *hɐŋ*$^{3'}$ 'uncomfortably hot (non-tactile)' (Section 4.1), 冰 *pən*^{1} 'freeze' and 凍 *tʊŋ*^{3} 'freeze' (Section 4.2). There is no monomorphemic term for neutral temperature. When offering non-chilled water, people may use the term 開水 *hai*^{1}*-łui*^{2} ('boiled-water') or 滾水 *k*^{w}*ɐn*^{2} *łui*^{2} ('boil water'); this term can refer to water that is still boiling, or boiled water that has cooled down to a "lukewarm" temperature, or anything in between.

4.1 Warming temperature terms

There are three basic temperature terms for warming temperature: 暖 *nun*^{5} ‘warm’, 熱 *ɲit*^{5} ‘non-tactile hot’, and ○ *lat*^{3} ‘tactile hot’.

Comfortable warming temperature is 暖 *nun*^{5}. This word is of Sinitic origin, c.f. Middle Chinese 暖 **nuan*^{B} ‘warm’, Cantonese *nyun*^{5} ‘warm’, Mandarin *nuǎn* ‘warm’, Shanghainese *nø* ‘warm’, Taiwanese Southern Min *luan*^{2} ‘warm’. It signifies both tactile and non-tactile comfortable warmth.

(40) *kə*^{3} *kan*^{1} *fʊŋ*^{4} *hau*^{2} *nun*^{5}. *hau*^{2} *ɬi*^{1}*fʊk*^{6}.
DEM CLF room very warm very comfortable
‘This room is very warm. It is very comfortable.’

(41) *kɐm*^{1}*ɲɐt*^{5} *ɲɐt*^{5}*təu*^{4} *hau*^{2} *nun*^{5}.
today sun very warm
‘The sun is warm today.’ (i.e. sunny and at a pleasant temperature)

(42) *ŋa*^{5} *mu*^{1} *kəi*^{5} *təu*^{4}, *wɐn*^{1} *nun*^{5}, *mɐŋ*^{4} *ɬəi*^{2}.

1SG touch 3SG head still warm not_yet die

'It touched his/her head, it was still warm, s/he has not died yet.'

(43) *kə*^{3} *pɔi*^{1} *tʃa*^{4} *wɐn*^{1} *nun*^{5}. *ɲɐm*^{2} *la*^{3}*!*

DEM cup tea still warm drink FP

'The cup of tea is still warm. Please drink it!'

(44) *kə*^{3} *pun*^{4} *ɬui*^{2} *nun*^{5}*~nun*^{5}*-təi*^{6}.

DEM tub water warm~ish-ish

'The tub of water is warmish.'

(45) *ŋa*^{5} *ɬɛŋ*^{2} *mai*^{5} *ɐt*^{2} *kin*^{6} *nun*^{5} *kə*^{3} *laŋ*^{1} *ɬam*^{1}.

1SG want buy one CLF warm MOD wool upper_garment

pəi^{2} *kə*^{3} *kin*^{6} *nun*^{5}*-tɪk*^{3} *kə*^{3} *laŋ*^{1} *ɬam*^{1}.

compare DEM CLF warm-CMPR MOD wool upper_garment

'I want to buy a sweater. One which is warmer than this.'

The word *nun*^{5} 'warm' is used less often than *ɲit*^{5} 'non-tactile hot' and *lat*^{3} 'tactile hot', and usually only for comfortable warmth. In English one

might describe a slightly unpleasantly high temperature as 'too warm', in Southern Pinghua one would say *ɲit*^{5} 'non-tactile hot' or *lat*^{3} 'tactile hot' rather than *t*^{h}*ai*$^{3'}$ *nun*^{5} 'too warm'. Temperature described as 熱 *ɲit*^{5} or ○ *lat*^{3} is not necessarily uncomfortable; it is simply higher than the pleasant warming temperature described by 暖 *nun*^{5} 'warm'. Cantonese *nyun*^{5} 'warm' is the same as *nun*^{5} (cf. Section 5.1 on Cantonese *nyun*^{5}).

The word 熱 *ɲit*^{5} is of Sinitic origin, c.f. Middle Chinese 熱 **ŋjɛt*^{D} 'hot', Cantonese *jit*^{6} 'hot', Shanghainese *ɳiɪʔ* 'hot', Mandarin *rè* 'hot'. In most Sinitic languages, 熱 **ŋjɛt* refers to both tactile and non-tactile types of heat. Nonetheless, Southern Pinghua is not unique amongst Sinitic languages in having a tactility distinction for the warming temperature terms. For instance, Taiwanese Southern Min has the distinction of 熱 *luah*^{8} 'non-tactile hot' versus 燒 *sio*^{1} 'tactile hot' (c.f. Middle Chinese 燒 **ɕjɛu*^{A} 'burn'). The word 熱 *ɲit*^{5} in Southern Pinghua covers both ambient and personal feeling types of warming temperature, e.g. *kɐm*^{1}*ɲɐt*^{5} *hau*^{2} *ɲit*^{5} (today very hot) 'it is very hot today', *ŋa*^{5} *hau*^{2} *ɲit*^{5} (1SG very hot) 'I am

very hot'[7]. Alternatively, one could also use the verb *kam²tau³* 'feel' to express personal feelings: *ŋa⁵ kam²tau³ ɲit⁵* (1SG feel hot) 'I feel hot'. The following are some examples of 熱 *ɲit⁵* 'non-tactile hot' in Southern Pinghua.

(46) *kɐm¹ɲɐt⁵ hau² ɲit⁵, na²mun⁴ tu¹ mi⁵ ɬɛŋ² tʃɔ³.*
today very hot what all NEG want do
'Today is very hot, I do not want to do anything.'

(47) *hai² tʃʰui¹ lɐi⁴ kə³ fɔŋ¹ ɬi⁶ ɲit⁵ kə³.*
sea blow come MOD wind be hot MOD
'The wind blowing in from the sea is hot.'

(48) *ɲit⁵-tʰin¹ nɛ³ tʃəu⁶ mi⁵ jəu⁵ mɐn⁴-tʃɛŋ³.*
hot-day TOP then NEG have mosquito-tent
'In the hot season she does not have a mosquito net.'

[7] In Sinitic languages, predicative adjectives are rarely unmodified. For instance, it is normal to say something like 'it is very hot', 'it is a little bit hot', 'it is not hot', but it is rarer to say something like 'it is hot', where the predicative adjective is unmodified.

(49) *nəi*^{5} *həi*$^{3'}$ *ku*^{3} *kɐŋ*^{2} *ɲit*^{5} *kə*^{3} *təi*^{6}*fɔŋ*^{1} *mɐŋ*^{4}*?*

2SG go EXP so hot MOD place not_yet

'Have you been to such a hot place?'

Within the semantic domain of 熱 *ɲit*^{5} 'non-tactile hot' there is a more specific temperature term: ○ *hɐŋ*$^{3'}$ 'very (uncomfortably) non-tactile hot', which is synonymous with *hau*^{2} *ɲit*^{5} 'very hot (non-tactile)'.

(50) *kə*^{3} *tɔi*^{1} *hu*^{2} *hau*^{2} *hɐŋ*$^{3'}$.

DEM pile fire very extra_hot

'The campfire is too hot.'

(51) *ŋa*^{5} *kam*^{2}*tau*^{3} *hɐŋ*$^{3'}$. *kə*^{3} *kan*^{1} *fɔŋ*^{4} *t*^{h}*ai*$^{3'}$ *hɐŋ*$^{3'}$ *tɔ*^{1}.

1SG feel extra_hot DEM CLF room too extra_hot too

'I feel uncomfortably hot. This room is too hot.'

The word ○ *hɐŋ*$^{3'}$ [hɐŋ˧˥] 'uncomfortably hot (non-tactile)' in Southern Pinghua is probably related to ○ *hɪŋ*^{3} 'hotter than normal' in Cantonese (see Section 5.1). The tones in these words are descended from Middle Chinese tone *C. Many nearby Tai languages also have a similar word in the corresponding tone *B (Tai tone *B corresponds with Chinese tone *C), e.g. Wuming Northern Zhuang *hwngq* [hɯŋ˧˥] 'hot (weather)' (Zhang et al. 1999: 778), Lungchow Southern Zhuang [kʰaːŋ˧˥] 'dry by fire' (Li 1977). There are two possible etyma of Southern Pinghua ○ *hɐŋ*$^{3'}$ [hɐŋ˧˥] 'uncomfortably non-tactile hot', but the tones of neither of them match the tones of the aforementioned words: Middle Chinese 熬 **kʰieŋ*^{B} 'dry by fire' and Proto-Tai **kʰaŋ*^{A} 'dry by fire' (c.f. Yanshan Southern Zhuang [xaŋ˧˥] 'hot (weather)' (Zhang et al. 1999: 778), Lao □□□ *khaang3* 'to dry/heat', Thai ขาง *khaaŋ5* 'dry by fire'). Just looking at the segments, while Cantonese *hɪŋ*^{3} 'hotter than normal' is a normal reflex of Middle Chinese 熬 **kʰieŋ*^{B} 'dry by fire', in Nanning Southern Pinghua the normal reflex would be something like *hən*, not *hɐŋ*$^{3'}$. This leaves the other possibility, which is that the Southern Pinghua *hɐŋ*$^{3'}$ [hɐŋ˧˥] is a newer phonetic loan[8] (or perhaps

[8] "Phonetic loans": loans where the surface phonetic form of the word in the borrowing language resembles the

backloan) from a relatively modern Zhuang form like *hwngq* [hɯŋɬ˩] 'hot (weather)' in Wuming Northern Zhuang[9].

The general word for tactile hotness is ○ *lat*^{3}. For example, *lat*^{3} *łui*^{2} ('hot water') usually means water that is at a temperature that is comfortable for drinking or bathing. On the other hand, *hau*^{2} *lat*^{3} 'very hot' signifies an uncomfortably high temperature. The following are some examples of *lat*^{3}.

(52) *kə*^{3} *tɪk*^{3} *łui*^{2} *hau*^{2} *lat*^{3}, *tan*^{6}*łi*^{6} *mi*^{5} *k*^{w}*ɐn*^{2} *ku*^{3},
DEM MASS water very hot but NEG boil EXP
wən^{1}*tɔ*^{6} *tʃui*^{3} *tɔ*^{1} *tʃɐt*^{3}*-łɐp*^{6} *tɔ*^{6}.
temperature most much seven-ten degree

surface phonetic form of the word in the donor language. This contrasts with "phonological loans" where the phonological forms follow the usual sound correspondence rules that exist in the older loanwords between the two languages. The difference between these two is not necessarily the age of the borrowing. While phonetic loans have to be synchronic, phonological loans need not be old: when there is an intense history of borrowing between two languages, speakers can borrow new terms from another language, but apply historical sound correspondence rules.

[9] Lin (2003) provides an alternative etymon for *hɐŋ*$^{3'}$: 煬 **jaŋ*^{C} 'roast'. While it is true that **j* could have *h* as a reflex in Pinghua and many non-Cantonese Yue dialects, and that the tone in *hɐŋ*$^{3'}$ 'uncomfortably (non-tactile) hot' traces back to Middle Chinese tone *C, the tone 3' in Nanning Pinghua suggests that the onset was voiceless. The regular reflex of 煬 **jaŋ*^{C} 'roast' in Nanning Pinghua would be *jɐŋ*^{6} (and in Cantonese *jœŋ*^{6}), which is quite different from *hɐŋ*$^{3'}$.

'The water is very hot, but it has not been boiled, the temperature is at most seventy degrees.'

(53) *hau² lat³ pɔ³ˀ! mɐi³ mu¹ pɔ³ˀ! lʊk³ tʃət² łɐu² kə³ pɔ³ˀ!*

very hot FP NEG;IMP touch FP scald CLF hand MOD FP

'It is very hot! Do not touch! It will scald your hand!'

(54) *ŋa⁵ mu¹ łɐi³mɐn¹tʃai² kə³ ŋak⁵təu⁴, jəu⁵ tɪk³ lat³.*

1SG touch child MOD forehead exist bit hot

'I touched the child's forehead, and it was a bit hot.' (e.g. feverish)

(55) *hai¹ tɪk³ lat³ łui² hɐi³ˀ nəi⁵ łɐi² łɐn¹.*

burn MASS hot water give you wash body

'I will get some hot water readied for you to take a bath.'

(56) *ɲa¹ pɔi¹ lat³ nai⁵ hɐi³ˀ ŋa⁵.*

take cup hot milk give 1SG

'Give me the cup of hot milk.'

The word *lat*^{3} ‘tactile hot’ can function as a causative verb on its own: *lat*^{3} ‘heat something up’. Alternatively, an analytic causative construction can be formed with the causative verb 整 *tʃən*^{2}*: tʃən*^{2} *lat*^{3} (make hot) ‘heat up’. (In contrast, the word *jən*^{1} ‘cold’ on its own does not have causative meaning; see Section 4.2.)

(57) *ŋa*^{5} *paŋ*^{1} *nəi*^{5} *ɲa*^{1} *həi*$^{3'}$ *lat*^{3} *ha*^{5}*tʃi*^{2} *la*^{3}.
1SG help 2SG take go heat_up moment FP
‘Let me take it and heat it up a little bit for you.’

The Southern Pinghua word *lat*^{3} ‘tactile hot’ probably has the same source as Cantonese *naat*^{3} ‘very hot to touch’ or ‘apply dry heat’. Words of similar form and meaning are frequently found amongst the Southern Sinitic languages (including Southwestern Mandarin). Some of these, like Taiwanese Southern Min *luah*^{8} ‘non-tactile hot’ and Nanchang Gan [letˈ] ‘hot’, are regular reflexes of the general Sinitic word for ‘hot’ 熱 **ɲjɛt*^{D}. Others, like Liuzhou Mandarin [la˧˩] ‘hot’, have another source: 爛 **laj*^{C} ~

火剌 **lat*^{D} ‘fierce of fire’ (Lin 2003: 49)[10]. However, in Southern Pinghua and Cantonese at least, the tone 3 in *lat*^{3}/*naat*^{3} is not the Lower tone D that the voiced onset of 火剌 **lat*^{D} would have caused (the expected reflexes of 火剌 **lat*^{D} are Southern Pinghua *lat*^{5} and Cantonese *laat*^{6}). The unexpected tones of the Southern Pinghua *lat*^{3} and Cantonese *naat*^{3} can perhaps be explained by influences from neighbouring Tai languages which have reflexes of Proto-Tai **ɗɤːt*^{D} ‘boil (intr.)’ (or **ɗuat*^{D} ‘hot’ (Li 1977)), e.g. Wuming Northern Zhuang *ndat* [ɗaːtɬ] ‘hot’, Jingxi Southern Zhuang [ɗuːtɭ] ‘hot’ (Zhang et al. 1999: 778), and Tiandeng Southern Zhuang *dut5* ‘hot’ (Section 3). The tone 3 in Cantonese *naat*^{3} ‘singe’ does in fact predict that it descended from tone D and the onset is not (modal) voiced, which makes Proto-Tai **ɗɤːt*^{D} ‘boil (intr.)’ a more likely source than Middle Chinese 火剌 **lat*^{D} ‘fierce of fire’. With Southern Pinghua *lat*^{3}, another fact is that all obstruent-ending syllables with tone 3 are either expressive or non-native. This further suggests that Southern Pinghua *lat*^{3} [latɭ] ‘tactile hot’ was borrowed, or at least has its tone influenced by neighbouring Zhuang languages. (See also footnote 4.)

[10] There is also an interesting discussion, in Chinese, on ‘singe/score’ amongst Sinitic languages: www.pkucn.com/viewthread.php?tid=214622&extra=page%3D180&page=3.

20131225 draft of: de Sousa, Hilário & Langella, François & Enfield, N.J. 2015. Temperature terms in Lao, Southern Zhuang, Southern Pinghua and Cantonese. In Koptjevskaja-Tamm, Maria (ed.), *Linguistics of temperature* (Typological studies in language 107): 594–638. Amsterdam: John Benjamins. *Do not quote or cite this draft.*

4.2 Cooling temperature terms

There are two general cooling temperature terms: ○ *jən*[1] 'cold' and 涼 *lɛŋ*[4] 'cool'.

Less severe cooling temperature is 涼 *lɛŋ*[4] 'cool'. Unlike *nun*[5] 'warm' which describes a comfortable temperature, *lɛŋ*[4] 'cool' can describe either comfortable or uncomfortable types of coolness, e.g. *jəu*[5] *tɪk*[3] *lɛŋ*[4] (exist bit cool) is either slightly comfortably cool or slightly uncomfortably cool, *hau*[2] *lɛŋ*[4] (very cool) is either pleasantly cool on a hot day, or uncomfortably chilly on a cold day.

(58) *kɐm*[1]*-ja*[6] *kə*[3] *fʊŋ*[1] *hau*[2] *lɛŋ*[4].
to-night MOD wind very cool
'The wind tonight is very cool.' (comfortable or uncomfortable)

There are also compounds like 清涼 *tʃʰən*^{1}*-lɛŋ*^{4} (‘clear-cool’) and 涼爽 *lɛŋ*^{4}*-łaŋ*^{2} (‘cool-fresh’) which specify comfortable type of coolness (these two words seem to be synonymous).

(59) *łui*^{2}*-tʃi*^{4} *kə*^{3} *łui*^{2} *hau*^{2} *lɛŋ*^{4}*-łaŋ*^{2}.
water-pool MOD water very cool-fresh
‘The water in the pond is (refreshingly) cool.’

(60) *łɐi*^{3}*mɐn*^{1}*tʃai*^{2} *ai*^{3} *tʃəi*^{6} *tʃʰən*^{1}*-lɛŋ*^{4} *kə*^{3} *təi*^{6}*fʊŋ*^{1} *łui*^{6}*kau*^{3}.
child like at clear-cool MOD place sleep
‘Children like to sleep in places that are cool.’

Southern Pinghua has a term for ‘cold’, ○ *jən*^{1} ‘cold’, which is possibly Sinitic. The following are some examples of ○ *jən*^{1} ‘cold’.

(61) *kə*^{3} *un*^{2} *tʰaŋ*^{1} *jən*^{1} *la*^{2}.
DEM bowl soup cold PRF
‘The bowl of soup has become cold.’

(62) *kɐm*^{1}*-ɲɐt*^{5} *hau*^{2} *jən*^{1}, *łɐu*^{2} *kɛk*^{2} *tu*^{1} *ma*^{4} *la*^{2}.

to-day very cold hand foot all numb PRF

'Today is very cold, (my) hands and feet are numb.'

(63) *jən*^{1} *mɛ*^{3}*'?* *jən*^{1}. *jən*^{1} *tɐk*^{2} *ŋa*^{5} *łɐn*^{1} *tu*^{1} *łɐn*^{4}.

cold Q cold cold CM 1SG body even shake

'Do you feel cold/Is it cold?' 'Yes. It is so cold that my body shivers.'

(64) *kə*^{3} *kəi*^{2} *kə*^{3} *wit*^{5} *nəi*^{5} *mɐi*^{3} *ɲɐm*^{2} *jən*^{1} *łui*^{2}.

DEM few CLF month 2SG NEG;IMP drink cold water

'Do not drink cold water in these few months.'

(65) *kə*^{3} *tʃœŋ*^{2} *jən*^{1} *kə*^{3} *tʃən*^{4}*hən*^{4} *nan*^{4} *hi*^{5} *łɛŋ*^{2}*tʃɛŋ*^{6}.

DEM type cold MOD scenario difficult take_to imagine

'The (level of) coldness is difficult to imagine.'

The word ○ *jən*^{1} on its own does not have causative meaning (unlike ○ *lat*^{3} 'hot (tactile)'; see Section 4.1 above). 'To chill' is *tʃən*^{2} *jən*^{1} (make cold), or 冰 *pən*^{1} (literally 'ice') described below.

Clear cognates of ○ *jən*^{1} 'cold' are not found in Sinitic languages outside of Guangxi. Determining the etymology of ○ *jən*^{1} 'cold' in Southern Pinghua is not a simple matter. The word ○ *jən*^{1} 'cold' in Southern Pinghua looks suspiciously like the reflexes of Proto-Tai **ˀjen*^{A} 'cool' (Li 1977), e.g., Lao □□□□ *jên3* 'cool/fresh' (Section 2), Thai เย็น *jen1* 'cool', Wenshan Southern Zhuang [jin˩˩˧] 'cold (weather)' (Zhang et al. 1999: 778). In addition, the tones correspond perfectly. However, a word of the same form is largely absent in the Zhuang languages in Guangxi that Pinghua has the most contact with (e.g. Tiandeng Southern Zhuang lacks a reflex of **ˀjen*^{A} 'cool'; Section 3). On the other hand, Lin (2003) provides a Sinitic etymon: Middle Chinese 湮 **ʔin*^{A} 'appearance of cold'. However, attested reflexes of the syllable **ʔin*^{A} in Nanning Southern Pinghua include *ɐn*^{1} and *in*^{1}, and *jən*^{1} is not a possible reflex of **ʔin*^{A}. Given that amongst Sinitic languages, words with similar shape and "cooling" meaning are confined to Pinghua

and Western Yue dialects[11], and that Pinghua and Yue have strong Kra-Tai substrata, the existence of the word *jən*^{1} in Nanning Pinghua is probably a Tai-related phenomenon.

Looking at the words for "cold" in other Sinitic dialects in the vicinity of Nanning, Lin (2003: 48) reports that in the Pinghua of neighbouring Binyang County (to the northeast), the term for 'cold' is *kat*^{7}, and in the Cantonese of Wuzhou further east, the term for 'cold' is *kɐn*^{5}. These terms look like Proto-Tai **kat*^{D} 'bite' or 'cold' (c.f. Tiandeng Southern Zhuang *kat4* 'very cold'; Section 3).

Within the semantic range of ○ *jən*^{1} 'cold' is 冰 *pən*^{1}, which is literally 'ice'. As an adjective, it is used only attributively. Extreme coldness (which for people in the sub-tropics starts perhaps a few degrees above freezing point) can be described as *pən*^{1} 'ice', and it seems that *pən*^{1} is only used in relation to tactile feeling. Things that are chilled artificially are often described as *pən*^{1} 'ice'. For instance, milk that has been in the fridge is

[11] One Sinitic lookalike of *jən*^{1} is 瀅 **ɐŋ*^{C} 'cold', e.g. Shanghainese 瀅 *in* 'cool'. However, the tone A in the Nanning Pinghua *jən*^{1} 'cold' does not match the tone C in 瀅 **ɐŋ*^{C} 'cold' (the regular reflex of 瀅 **ɐŋ*^{C} in Nanning Pinghua would be *ən*^{3}). Another Sinitic lookalike is 陰 **ʔim*^{A} 'Yin' (as in 'Yin and Yang'). However, Southern Pinghua retains **-m* codas very faithfully, and the reflex of 陰 **ʔim*^{A} is *jɐm*^{1}, not *jən*^{1}.

usually described as *pən*^{1} *nai*^{5} ‘ice milk’ rather than *jən*^{1} *nai*^{5} ‘cold milk’. Despite the literal meaning of *pən*^{1} ‘ice’, *pən*^{1} *nai*^{5} ‘ice milk’, or *pən*^{1} *łui*^{2} ‘ice water’, does not necessarily have ice in it.

As mentioned Section 4.1 above, *jən*^{1} ‘cold’ on its own does not have causative meaning. Leaving something to cool down naturally to room temperature is *t*^{h}*an*^{1} *jən*^{1} (lie_flat cold). ‘Chill’ or ‘freeze’ is 冰 *pən*^{1} (literally ‘ice’), 冰凍 *pən*^{1}*tʊŋ*^{3}, or 凍 *tʊŋ*^{3} (see also Section 5.2 for the use of 凍 *dung*^{3} ‘cold’ in Cantonese).

(66) *kə*^{3} *tɪk*^{3} *ła*^{1} *hau*^{2} *jən*^{1}, *pən*^{1} *kɛk*^{2}.
DEM MASS sand very cold freeze foot
‘The sand is very cold, it freezes my feet.’

(67) *nəi*^{5} *ɲa*^{1} *tɪk*^{3} *hai*^{1}*łui*^{2} *həi*$^{3'}$ *pən*^{1}*tʊŋ*^{3}.
2SG take MASS boiled_water go chill
‘Take the boiled water and chill it (in the fridge).’

(68) *kəi*^{5} *həi*$^{3'}$ *pa*^{4} *łan*^{1} *tʊŋ*^{3} *łɛŋ*^{1} *tʃət*^{2} *łəu*^{2}.

3SG go climb mountain freeze hurt CLF hand

'S/he went mountain climbing and suffered frostbite to his/her hands.'

(69) *nəi^{5} łən^{4} tʊŋ^{3} kɛk^{2} la^{2}. lɐi^{3} tɪk^{3} la^{4}bak^{6} ʧai$^{3'}$ lɐi^{4} łɐi^{2}.*

2SG form freeze foot CS find MASS radish leaf come wash

'You have cracked feet, get some radish leaves and wash your feet with it.'

(People get cracked feet from working in paddy fields barefoot in very cold weather.)

5 Temperature terms in Cantonese

Cantonese has an inventory of temperature terms that is more typical of Sinitic languages: the basic temperature terms in Cantonese are easily recognisable by speakers of other Sinitic languages (i.e. cognates of them are found throughout the entire Sinitic family), and there is no tactility distinction with the temperature terms. There are four basic temperature

adjectives: 熱 *jit*^{6} 'hot', 暖 *nyun*^{5} 'warm', 涼 *loeng*^{4} 'cool', and 凍 *dung*^{3} 'cold'.

熱 *jit*^{6} 'hot'
暖 *nyun*^{5} 'warm'
涼 *loeng*^{4} 'cool'
凍 *dung*^{3} 'cold'

Figure 6. The main temperature adjectives in Cantonese.

Out of these terms, 熱 *jit*^{6} 'hot' and 凍 *dung*^{3} 'cold' could be said to be the most basic. The most prototypical WARMING and COOLING temperatures are described as 熱 *jit*^{6} 'hot' and 凍 *dung*^{3} 'cold' respectively. For instance, when asking whether one prefer drinks like "milk tea" at WARMING or COOLING temperature, the words used are 熱 *jit*^{6} 'hot' and 凍 *dung*^{3} 'cold'. There are also no simple terms for NEUTRAL temperature. For instance, beer that has risen to room temperature is 暖咗 *nyun*^{5}*-zo*^{2} 'warmed'.

In addition to the temperature terms described above, there are other non-basic temperature terms like ○ *hing*^{3} 'very hot', ○ *naat*^{3} 'too hot to touch' (Section 5.1), 冷 *laang*^{5} 'cold', 寒 *hon*^{4} 'cold' and 溫 *wan*^{1} 'slightly warm' (Section 5.2). Except for *naat*^{3} 'too hot to touch' which often functions as a causative verb, the temperature adjectives in Cantonese rarely function as causative verbs[12]. Causative meaning can be expressed analytically; the most common method is to use the verb 整 *zing*^{2} 'make', e.g. *zing*^{2} *dung*^{3} *keoi*^{5} (make cold 3SG) 'chill it'.

The temperature adjectives can be modified by any degree modifiers, again with *nyun*^{5} 'warm' being the exception (see Section 5.1 below; similar to *nun*^{5} in Southern Pinghua (Section 4.1)). Most of the temperature adjectives, including the non-basic ones, have corresponding expressive forms:

hing^{3}*-hap*^{6}*hap*^{6} 'scorching' (bad connotation)

jit^{6}*-lat*^{1}*lat*^{1} 'hot' (good connotation)

[12] We would like to thank the anonymous reviewer for commenting that the temperature adjectives in Cantonese like *jit*^{6} 'hot' could actually be used as causative verbs. While this is true, cases of the temperature adjectives used as causative verbs are rare. Two synonymous constructions where this is possible are the delimitative constructions of 'X *jat*^{1} X' and 'X *ha*^{5}' (i.e. 'X it a bit'; *jat*^{1} is literally 'one'), e.g. *lik*^{1} *heoi*^{3} *dung*^{3} *jat*^{3} *dung*^{3} *keoi*^{5} (take go cold one cold it) 'take it and chill it a little bit'.

jit^{6}-*lat*^{6}*lat*^{6} 'hot' (bad connotation)

nyun^{5}-*lap*^{1}*lap*^{1} 'warm' (good connotation)

loeng^{4}-*zam*^{3}*zam*^{3} 'cool' (good connotation)

dung^{3}-*bing*^{1}*bing*^{1} 'cold' (usually bad connotation).

5.1 Warming temperature terms

The basic warming temperature terms are 暖 *nyun*^{5} 'warm' and 熱 *jit*^{6} 'hot'. They are used for both tactile and non-tactile temperature. The following are two examples.

(70) *siu*^{2}*siu*^{2} *nyun*^{5} *ze*^{1}, *jat*^{1} *di*^{1} *dou*^{1} *m*^{4} *syun*^{3} *jit*^{6},
little warm only one bit even NEG count hot
'It is only a little bit warm, it does not count as being hot at all,'
(小小暖姐,一o的都唔算熱,;
www.hometheater.hk/forum/viewthread.php?action=printable&tid=1147)

(71) *faan*^{2}*ji*^{4} *zung*^{1}*gaan*^{1} *lo*^{2} *dou*^{2} *ceot*^{1} *lai*^{4} *go*^{2} *gau*^{6} *zau*^{6}

instead middle take achieve exit come that CLF then

ou^{1}*kei*^{1} *jit*^{6}... *kei*^{4}*taa*^{1} *dou*^{1} *m*^{4} *syun*^{3} *nyun*^{5}...

reasonably hot others all NEG count warm

'On the contrary the one which you can take out from the middle is reasonably hot... the others cannot be considered to be warm...'

(反而中間囉到出黎個舊就OK熱...其他都唔算暖...;

www.hkepc.com/forum/archiver/?tid-1549538-page-44.html)

Sutrop (e.g. 1999) mentions that [Mandarin] Chinese only has one basic warming temperature term 熱 *rè*; 暖和 *nuǎnhuo*, which may be translated as 'warm', is actually a secondary relative temperature term "used only when temperature is rising, i.e. the earlier temperature was lower" (Sutrop 1999: 187). Nevertheless, 暖 *nyun*^{5} 'warm' in Cantonese is a basic absolute temperature term; unlike Mandarin, the earlier temperature of 暖 *nyun*^{5} 'warm' in Cantonese need not be lower, as shown in the following example where the temperature has dropped rather than risen.

(72) *aa^{3}neoi^{1} dou^{1} wa^{6} di^{1} faan^{6}sung^{3} m^{4} syun^{3} jit^{6}*

daughter also say MASS food NEG consider hot

zi^{2} hai^{6} nyun^{5}~nyun^{5}-dei^{2} zaa^{3}!

only be warm~ish-ish FP

'[My] daughter also said that the food was not hot, it was only slightly warm!' (Commenting on the temperature sustaining properties of lunch boxes.)

(阿囡都話啲飯餸唔算熱,只係暖暖地咋!; http://www.baby-kingdom.com/forum.php?mod=viewthread&action=printable&tid=5360092)

Similar to *nun^{5}* 'warm' in Southern Pinghua, *nyun^{5}* in Cantonese does not usually refer to temperature that is unpleasant. In English one might refer to a room as being 'too warm' and start removing clothing items; in Cantonese, it is more usual to say *jit^{6}* 'hot' rather than *taai^{3} nyun^{5}* 'too warm' if the temperature becomes even slightly unpleasantly warm. The expression *taai^{3} nyun^{5}* 'too warm' (i.e. hotter than *nyun^{5}* 'warm') is only acceptable when contrasting with previously mentioned, assumed or expected occurrences of *nyun^{5}* 'warm', for instance when talking about the

temperature-preserving ability of clothing items. In the following example, notice that only the 'garment' aspect of temperature is described as *taai*[3] *nyun*[5] 'too warm'; when talking about personal-feeling temperature, a different temperature term, English *hot*, is used.

(73) *zoek*[3] *dak*[1] *taai*[3] *nyun*[5], *hai*[2] *gung*[1]*si*[1] *ging*[6]-hot *tim*[1]
wear CM too warm at company ultra-hot FP
'Dressed too warm, felt ultra-hot at my office'
(著得太暖，在公司勁hot添;
www.ourtoysland.com/forum/viewthread.php?tid=1993&extra=&highlight=&page=7869)

Doing a search on Google for the exact strings of "太熱" *taai*[3] *jit*[6] 'too hot', "太暖" *taai*[3] *nyun*[5] 'too warm', "太涼" *taai*[3] *loeng*[4] 'too cool', "太凍" *taai*[3] *dung*[3] 'too cold', "太冷" *taai*[3] *laang*[5] 'too cold', and "太寒" *taai*[3] *hon*[4] 'too

cold'[13], the frequency of results clearly show that 太暖 *taai*^{3} *nyun*^{5} 'too warm' and "太寒" *taai*^{3} *hon*^{4} 'too cold' are used much less frequently.

Table 3. Searches of the exact strings "太X" (too X) with -不 唔 咗 on Google (accessed 1st January 2013).

		results
"太熱" *taai*^{3} *jit*^{6}	(too hot)	141,000
"太暖" *taai*^{3} *nyun*^{5}	**(too warm)**	**881**

[13] Searching for Written Cantonese material online is a tricky operation. Most writing in the Chinese world is written in Written Chinese (i.e. Written Mandarin). However, other Sinitic languages are also sometimes written, Cantonese in particular. Nonetheless, currently no search engines distinguish Written Chinese from written forms of other Sinitic languages like Written Cantonese; the language is indiscriminately considered "Chinese" by search engines when it is composed of Chinese characters. When searching for the Written Cantonese results online for this paper, the following search command is added: -不 唔 咗, i.e. exclude the Mandarin negator 不 *bù*, and include the Cantonese negator 唔 *m*^{4} and the Cantonese perfective marker 咗 *zo*^{2}.

Restricting to search results from Hong Kong or Macau also does not work, as authors are not necessarily from there (e.g., some Mainland Chinese blogs are hosted in Hong Kong), and Chinese authors in Hong Kong and Macau often write in Written Chinese rather than Written Cantonese. Restricting to results from Hong Kong and Macau would also exclude many Written Cantonese results from Mainland China. There are Cantonese corpora online, but none of them contain enough examples. For instance, in the Corpus of Hong Kong Cantonese (www.hku.hk/hkcancor/), the most frequent temperature adjective, *dung*^{3} 'cold', only occurred thirty-five times.

"太凉" *taai*^{3} *loeng*^{4}	(too cool)	4,200
"太凍" *taai*^{3} *dung*^{3}	(too cold)	22,900
"太冷" *taai*^{3} *laang*^{5}	(too cold)	13,400
"太寒" *taai*^{3} *hon*^{4}	(too cold)	753

Notice that this effect is significantly lessened if the modifier 幾 *gei*^{2} 'quite' is used instead. There is no restriction for the use of *gei*^{2} 'quite' with *nyun*^{5} 'warm'.

Table 4. Searches of the exact strings "幾X" (quite X) with -不 唔 咗 on Google (accessed 1st January 2013).

		results
"幾熱" *gei*^{2} *jit*^{6}	(quite hot)	11,000
"幾暖" *gei*^{2} *nyun*^{5}	**(quite warm)**	**1,670**
"幾凉" *gei*^{2} *loeng*^{4}	(quite cool)	2,940
"幾凍" *gei*^{2} *dung*^{3}	(quite cold)	10,900
"幾冷" *gei*^{2} *laang*^{5}	(quite cold)	632
"幾寒" *gei*^{2} *hon*^{4}	(quite cold)	571

A search on the use of the temperature terms themselves in Cantonese also shows that 暖 *nyun*[5] 'warm' is used much more frequently than 涼 *loeng*[4] 'cool' (Table 5 below). However, as shown in Table 3 above, 太暖 *taai*[3] *nyun*[5] 'too warm' is much less frequent in comparison with 太涼 *taai*[3] *loeng*[4] 'too cool'.

Table 5. Searches of X with -不 唔 咗 on Google (accessed 1st January 2013).

		results
熱 *jit*[6]	(hot)	3,650,000
暖 *nyun*[5]	**(warm)**	**887,000**
涼 *loeng*[4]	(cool)	134,000
凍 *dung*[3]	(cold)	1,650,000
冷 *laang*[5]	(cold)	1,590,000
寒 *hon*[4]	(cold)	432,000

There are two further non-basic temperature adjectives in the upper end of warming temperature range: ○ *hing*^{3} and ○ *naat*^{3}. The word *hing*^{3} describes temperature that is higher than normal temperature, usually dry, but not usually painfully hot. The word *hing*^{3} is usually written as 熲 (Middle Chinese **k^{h}ieŋ^{B}* 'dry by fire'), which is perhaps its true etymon, except that the tones do not match (see discussions on the etymology of Southern Pinghua *hɐŋ*$^{3'}$ and Cantonese *hing*^{3} in Section 4.1). It is usually used for tactile temperature or personal-feeling temperature, and rarely for ambient temperature. The ambient use of *hing*^{3} seems to be restricted to the (now old-sounding) idiom 天口熲 *tin*^{1} *hau*^{2} *hing*^{3} ('sky mouth hot') 'sweltering heat'.

(74) *ji*^{1}*sang*^{1} *mo*^{2} *jyun*^{4} *lam*^{4}*baa*^{1}*-sin*^{3} *zau*^{6} *waa*^{6}
doctor touch finish lymph-node then say
"nei^{5} *jau*^{5} *di*^{1} *hing*^{3} *wo*^{3}*"*
2SG exist bit hot FP
'After the doctor finished touching the lymph nodes, s/he said "you feel a bit hotter than normal there"'

(醫生摸完淋巴腺就話「你有d熨喎」;

cheliey.blogspot.com/2010/04/blog-post_15.html)

(75) *nei*^{5} *gok*^{3}*dak*^{1} *hing*^{3}*?* *ngo*^{5} *gok*^{3}*dak*^{1} *nei*^{5} *dung*^{3} *gwo*^{3} *ngo*^{5} *wo*^{3}

2SG feel hot 1SG feel 2SG cold pass 1SG FP

'You feel hot? It seems to me that you feel colder than me'

(你覺得熨? 我覺得你凍過我喎;

leungpuiki.blogspot.com/2009/11/blog-post_25.html)

Most instances of 熨 *hing*^{3} online are not using its literal meaning. One common metaphorical usage of *hing*^{3} is 'angry':

(76) up to you *jik*^{6} *"soeng*^{5} *nei*^{5}*"* *naat*^{3} *hing*^{3} *mit*^{1}*si*^{4}

translate up you apply_heat very_hot f_teacher

'"Up to you" [in English] translated as "mount you" [in Chinese], female teacher angered' (up to you譯「上你」辣熨Miss;

www.youtube.com/watch?v=sngZzckVWJk)

(*naat*^{3} is the process, and *hing*^{3} is the result)

Another metaphorical meaning of *hing*^{3} 'hot' has a sexual connotation, e.g.:

(77) *jik*^{1} *jyun*^{4} *san*^{1} *pou*^{4} *dim*^{2}

10^{8} dollar new party spot

gik^{1}*-gwong*^{1} *jit*^{6} *mou*^{5} *hing*^{3}*-hap*^{6}*hap*^{6}

laser-light hot dance hot-EXPV

'Hundred million dollar new party spot, laser beams and hot dance, hot!'

(億元新蒲點　激光熱舞 熒 焓焓;

www.youtube.com/watch?v=Vlxqpx0TAj8)

Another non-basic high temperature term is *naat*^{3}. Various Chinese characters are used to write *naat*^{3} (there is no consensus of how *naat*^{3} is written)[14], but the more likely source of this word is Middle Chinese 灴剌

[14] The most commonly assumed origin of *naat*^{3} is Old Chinese 焫 'burn'. However, this is unlikely: the expected reflex of 焫 (Old Chinese **ŋ̊iap*; Middle Chinese **ŋ̊wɛtᴰ*) in Cantonese is *jyut*^{6} (Mandarin *ruò*). Other characters which are used to write *naat*^{3} in Cantonese are also not likely to be the etymological source: 捺 *naat*^{6} (Middle Chinese **natᴰ* 'press by hand') and 辣 *laat*^{6} 'spicy hot'.

**lat*^{D} ‘fierce of fire’ and/or Proto-Tai **dɤ:t*^{D} ‘boil (intr.)’ (see discussion on this and the Southern Pinghua word *lat*^{3} ‘tactile hot’ in Section 4.1 above, and also footnote 4). The word *naat*^{3} in Cantonese signifies painfully tactile hot temperature.

(78) *go*^{3} *wun*^{2} *hou*^{2} *naat*^{3}, *jan*^{1} *zyu*^{6} *aa*^{3}!
CLF bowl very hot care DUR PF
‘The bowl is very hot, be careful!’
(個碗好焫，因住呀！；
cpls.proj.hkedcity.net/cpls/categoryDtl.jsp?cat=C1)

The word *naat*^{3} is more commonly used as a verb meaning to apply excessive heat to a surface (c.f. *lat*^{3} ‘tactile hot’ in Southern Pinghua which can also function as a verb; see Section 4.1.)

(79) *jyun*^{4}*loi*^{4} *bei*^{2} *kam*^{4}*-maan*^{5} *laam*^{2} *zyu*^{6} *ge*^{3} *jit*^{6}*-seoi*^{2}*-doi*^{2}
turns_out PASS yester-night cuddle DUR MOD hot-water-bag
naat^{3}*-can*^{1}, *hou*^{2} *tung*^{3} *aa*^{3}~~~~
burn -ADVT very painful FP

'It turns out that I was burnt by the hot water bottle that I was cuddling last night, it is very painful~~~~'

(原来俾琴晚揽住嗰热水袋焖亲,好痛啊~~~~;

t.mencase.com/index.php?m=ta&id=1780132583)

However, *naat*^{3} *sau*^{2} (burn hand) 'hand-burning' is used as an adjective, e.g. it can be modified by *hou*^{2} 'very'. (This is not like the external possession construction in Lao where the body part can be any body part; Section 2.)

(80) *bat*^{1}*gwo*^{3} *m*^{4} *hou*^{2} *mo*^{2} *lok*^{6} *heoi*^{3} *hou*^{2} *naat*^{3} *sau*^{2} *zau*^{6} *dak*^{1}

however NEG good touch down go very burn hand then OK

'Nonetheless it is alright as long as it is not very hand-burning when you touch it'

(不过唔好摸落去好"辣"手就得;

digital.discuss.com.hk/viewthread.php?tid=12429670&extra=&page=2)

5.2 Cooling temperature terms and water-specific terms

The basic cooling temperature terms are 涼 *loeng*^{4} 'cool' and 凍 *dung*^{3} 'cold'. They are used for both tactile and non-tactile temperature. The following are some examples.

(81) *nei*^{5} *jiu*^{3} *gei*^{3} *zyu*^{6}, *hai*^{6} *"dung*^{3}*",*
2SG need remember DUR be cold
m^{4} *hai*^{6} *"loeng*^{4}*~loeng*^{2}*-dei*^{2}*"... zan*^{1} *hai*^{6} *hou*^{2} *dung*^{3}*...*
NEG be cool~ish-ish real be very cold
'You have to remember, it is "cold", not "cool-ish"... it is really very cold...'
(你要記住,係"凍",唔係"涼涼地"...真係好凍....;
bbs.qoos.com/viewthread.php?action=printable&tid=1261759)

(82) *zan*^{1} *hai*^{6} *gam*^{3} *jit*^{6}*???? ngo*^{5} *ceot*^{1} *gaai*^{1} *zung*^{6} *gok*^{3}*dak*^{1}
real be so hot 1SG exit street still feel
loeng^{4}*~loeng*^{2}*-dei*^{2}

cool~ish-ish

'Is it really that hot???? When I went out I still felt coolish'

(真係咁熱????我出街仲覺得涼涼地;

www.rk333.com/viewthread.php?tid=17254)

Sutrop (1999) also mentions that in [Mandarin] Chinese, there is only one basic cooling temperature term 冷 *lěng*. The other cooling temperature term 涼快 *liángkuai* is actually a secondary relative temperature term meaning 'cooling down' rather than 'cool' (1999: 187). Cantonese is different in this respect. With 涼 *loeng*^{4} 'cool', the earlier temperature need not be higher, as shown in the following example where the temperature has risen rather than dropped.

(83) *seoi*^{1}*jin*^{4} *jau*^{5}*so*^{2} *wui*^{4} *wan*^{1}

although somewhat return warmth

bat^{1}*ging*^{2} *waan*^{4} *jau*^{5} *se*^{1} *"loeng*^{4}*~loeng*^{2}*-dei*^{2}*",*

even:so still exist bit cool~ish-ish

wu^{6}*ngoi*^{6} *wut*^{6}*dung*^{6} *si*^{4} *jiu*^{3} *zyu*^{3}*ji*^{3}

outdoor activity when need cautious

sik[1] dong[3] zang[1] gaam[2] ji[1] mat[6], "mai[5] laang[5]-can[1]".

appropriate add minus clothes NEG:IMP cold-ADVT

'Although it has become somewhat warmer, it is still a little bit cool, when doing outdoor activities you need to put on or take off clothing items appropriately, do not get a cold.'

(虽然有所回温，毕竟还有些"凉凉呦"，户外运动时要注意适当增减衣物，"咪冻亲"。http://health.ycwb.com/2010-01/26/content_2412228.htm)[15]

While *loeng[4]* 'cool' can be used for both tactile and non-tactile temperature, *loeng[4]* 'cool' is more often used for ambient and personal-feeling temperature, and less often for tactile temperature. When forming compounds with *seoi[2]* 'water', *loeng[4]* 'cool' is rarely used. Water at room temperature or colder tends to be referred to as *dung[3] seoi[2]* (cold water). Table 6 below shows that the frequency of *loeng[4] seoi[2]* (cool water) is

[15] This example is in Written Chinese (i.e. formal written Mandarin, transcribed in Cantonese pronunciation as a Cantonese person would read it out), except for the expressions in double quotation marks which are in spoken Cantonese.

significantly lower than phrases with other temperature terms. (Also included in this table are other compounds with temperature terms usually used only for liquid.)

Table 6. Searches of the exact strings "X水" (X water) with -不 唔 咗 on Google (accessed 22nd March 2012).

		results
"滾水" *gwan²* *seoi²*	(boil water)	18,000
"熱水" *jit⁶* *seoi²*	(hot water)	138,000
"暖水" *nyun⁵* *seoi²*	(warm water)	23,600
"溫水" *wan¹* *seoi²*	(slightly warm water)	9,970
"涼水" *loeng⁴* *seoi²*	**(cool water)**	**704**
"凍水" *dung³* *seoi²*	(cold water)	130,000
"冷水" *laang⁵* *seoi²*	(cold water)	27,300
"寒水" *hon⁴* *seoi²*	(cold water)	152
"冰水" *bing¹* *seoi²*	(ice water)	25,100

Compare this with the frequencies of the temperature terms themselves in Cantonese (Table 7). The occurrence of **涼** *loeng*^{4} 'cool' itself is not as rare.

Table 7. Searches of X with -不 唔 咗 on Google (accessed 1st January 2013).

		results
滾 *gwan*^{2}	(boil)	613,000
熱 *jit*^{6}	(hot)	3,650,000
暖 *nyun*^{5}	(warm)	887,000
溫 *wan*^{1}	(slightly warm)	145,000
涼 *loeng*^{4}	**(cool)**	**134,000**
凍 *dung*^{3}	(cold)	1,650,000
冷 *laang*^{5}	(cold)	1,590,000
寒 *hon*^{4}	(cold)	432,000
冰 *bing*^{1}	(ice)	1,500,000

There are a number of terms which signify "cold". The semantically most general "cold" term in Cantonese, and also the most frequently used one, is

凍 *dung*[3] 'cold'. There are two other less-used cold terms: 冷 *laang*[5] 'cold' and 寒 *hon*[4] 'cold'. The frequency of usage of 冷 *laang*[5] 'cold' is still quite high; sometimes it is not much lower than that of the basic term 凍 *dung*[3] 'cold'. However, 冷 *laang*[5] 'cold' is not a basic temperature term in Cantonese, as it is not frequently used to describe temperature other than ambient temperature, unlike 凍 *dung*[3] 'cold', which is used freely across all domains. The frequency of usage of 寒 *hon*[4] 'cold' is much lowr (see Tables 3 to 5 above). Native speakers consulted have different opinions on the semantics of 冷 *laang*[5] 'cold' and 寒 *hon*[4] 'cold'. The term 冷 *laang*[5] 'cold' is generally considered to have roughly the same temperature range as the basic term 凍 *dung*[3] 'cold', while the semantically narrower 寒 *hon*[4] 'cold' is for some people "extreme cold weather", and for others "colder than cool, but not necessarily too cold". Online searches suggest that the temperature associated with "very cold" expressed by these three temperature terms do not differ greatly (all three examples appear to be written by people living in Hong Kong).

(84) *gam*[1]*jat*[6] *hou*[2] *dung*[3] *aa*[3] ** *dak*[1] *go*[1] *sap*[6]*saam*[1] *dou*[6] *zaa*[3]....

today very cold FP get that thirteen degree only

'It is very cold today** Only 13 degrees....'

(今日好凍呀**得歌13度咋....; eva-playboy.xanga.com/561108179/item/)

(85) *gam^{1}jat^{6} hou^{2} laang^{5} aa^{3}, sap^{6} dou^{6} zaa^{3},*

today very cold FP ten degree only

'It is very cold today, only 10 degrees,'

(今日好冷呀，10度啫，; yu1984.xanga.com/757857856/item)

(86) *gam^{1}jat^{6} hou^{2} hon^{4} aa^{3}~*

today very cold FP

zung^{1}jyu^{1} jau^{5} sing^{3}daan^{3} ge^{3} gam^{2}gok^{3} laa^{3}!

finally exist Christmas MOD feeling CS

'It is very cold today, finally it feels like Christmas!'

(今日好寒呀~終於有聖誕既感覺啦!!!; www.facebook.com/permalink.php?story_fbid=129176317142327&id=118413748198299)

(Facebook comment to a news article with the following headline:)

kam[1]*-zou*[2] *sap*[6]*sei*[3] *dim*[2] *saam*[1] *dou*[6] *jap*[6] *dung*[1] *zeoi*[3] *dai*[1]

this-morning fourteen point three degree enter winter most low

'14.3 degrees this morning; lowest since the beginning of winter'

今早14.3度入冬最低;

hk.news.yahoo.com/article/101208/4/lnj0.html)

The semantic changes of these "cold" terms from Middle Chinese are interesting. Historically, 凍 *dung*[3] (Middle Chinese **tuʷŋ*[C]) was 'freeze', 冷 *laang*[5] (Middle Chinese **læŋ*[B]) was 'cold' (in Old Chinese it was 'cool'), and 寒 *hon*[4] (Middle Chinese **ɣan*[A]) was extreme coldness. This is still largely the case for Mandarin: 凍 *dòng* 'freeze', 冷 *lěng* 'cold', 寒 *hán* 'very cold'. Southern Pinghua has also retained 凍 *tʊŋ*[3] as 'freeze' (Section 4.2; Southern Pinghua has also been much more strongly influenced by Mandarin). However, for Cantonese, most speakers of which would not have witnessed natural freezing, 凍 **tuʷŋ*[C] 'freeze' became 凍 *dung*[3] 'cold'. ('Freeze' is conveyed analytically in Cantonese: 結冰 *git*[3]*bing*[1] (form ice).) Nonetheless, there are still some literary, i.e. Mandarin-sounding,

compounds where 凍 *dung*^{3} means 'freeze', e.g. 凍肉 *dung*^{3}*juk*^{6} 'frozen meat'. Some other "cold" terms like 冷 *laang*^{5} 'cold' and 寒 *hon*^{4} 'cold' also survived in Cantonese, but their semantics became less clear to Cantonese speakers. When used attributively, 冷 *laang*^{5} 'cold' is often used in noun compounds, whereas 寒 *hon*^{4} 'cold' is only used in very few noun compounds. For instance, 冷麵 *laang*^{3} *min*^{6} ('cold noodle') in Cantonese usually refers to specific Korean or Japanese dishes which involve noodles served cold (e.g. Korean 랭면 *raengmyŏn*/ 냉면 *naengmyŏn*, Japanese そうめん *sōmen*). Other cold noodle dishes, like Northern Chinese 涼皮 *liángpí* ('cool skin') and Vietnamese *bún chả giò* 'spring roll noodles' are not 冷麵 *laang*^{3} *min*^{6} ('cold noodle'); they are just "noodles which are cold" 凍嘅麵 *dung*^{3} *ge*^{3} *min*^{6} ('cold MOD noodle'), or perhaps one could also say 冷嘅麵 *laang*^{5} *ge*^{3} *min*^{6} ('cold MOD noodle') (but not *寒(嘅)麵 **hon*^{4} *(ge*^{3}*) min*^{6}). One compound that involves 寒 *hon*^{4} 'cold' is 寒假 *hon*^{4}*gaa*^{3} 'winter holiday', of which the temperature is not necessarily cold. During winter holidays in the Pearl River Delta, the temperature can be just above zero

degrees centigrade if there is a cold front from the North, but it can also be twenty degrees centigrade or more.

Finally, there are three other temperature-related terms that are often used with water: 滾 *gwan*^{2} 'boil', 溫 *wan*^{1} 'slightly warm' and 冰 *bing*^{1} 'ice' (see Table 7 above). The word 滾 *gwan*^{2} 'boil' is a verb; there are basically only a few commonly used noun compounds which contain an attributive *gwan*^{2} like *gwan*^{2} *jau*^{4} 'boiling oil' and *gwan*^{2} *seoi*^{2} 'boiling water'. (In older usage, *gwan*^{2} *seoi*^{2} ('boil water'), or more explicitly *dung*^{3} *gwan*^{2} *seoi*^{2} ('cold boil water'), also refers to drinkable water that was boiled but has since cooled down.) The morpheme 溫 *wan*^{1} 'slightly warm' (not NEUTRAL), in its temperature sense, is not used as an independent word in Cantonese. The Middle Chinese 溫 **ʔuənᴬ* has the meaning of 'peace, peaceful, warm' and in modern Cantonese it forms compounds like *wan*^{1} *dou*^{6} (*wan*^{1} 'degree') 'temperature' and *wan*^{1} *nyun*^{5} (*wan*^{1} 'warm') 'warm'. There are also metaphorical uses like *wan*^{1} *wo*^{4} (*wan*^{1} 'peace') 'mild' (in, e.g., temper, medicinal effect), *wan*^{1} *jau*^{4} (*wan*^{1} 'soft') 'tender, gentle', and causative uses like *wan*^{1} *zaap*^{6} (*wan*^{1} 'learn') or *wan*^{1} *syu*^{1} (*wan*^{1} 'book') 'revise' (i.e. to make it "warm" again), and the modern slang *wan*^{1} *neoi*^{2}/*zai*^{2} (*wan*^{1}

'girl/boy') 'spending (too much) time with one's girl/boyfriend'. The word *bing*[1] is the noun 'ice' (cognate of Southern Pinghua *pən*[1]; Section 4.2). All of the aforementioned terms, other than *loeng*[4], form compounds with *seoi*[2] 'water' readily (see Table 6).

6 Conclusion

In this paper we have discussed basic temperature terms and some other temperature-related terms in four languages: the Tai languages Lao (Section 2) and Southern Zhuang (Section 3), and the Sinitic languages Southern Pinghua (Section 4) and Cantonese (Section 5). The following is a summary of the basic temperature terms in these four languages.

	Lao	Southern Zhuang		Southern Pinghua		Cantonese
		tactile	n-tactile	tactile	n-tactile	
"hot"	*hòòn4*	*dut5*	*dut5*	*lat*[5]	*ɲit*[5]	*jit*[6]
"warm"	*qun1*		*thau6*	*nun*[5]		*nyun*[5]

"cool"	*jên3*	*luŋ1*	*lɛŋ*[4]	*loeng*[4]
"cold"	*naaw3*	*tot5*	*jən*[1]	*dung*[3]

Figure 7. The basic temperature terms in Lao, Southern Zhuang, Southern Pinghua and Cantonese.

There are other non-basic temperature terms. While extreme temperature terms are common, neutral temperature terms are rare. The following are some non-basic temperature terms discussed in this paper.

	Southern Zhuang			Southern Pinghua		Cantonese	
	water	ambient	personal	+tact.	–tact.	+tact.	–tact.
						naat[3]	
					hɛŋ[3']		*hing*[3]
"hot"							
"warm"							
							wan[1]
neutral		*nuai6/ thau6*					

	luŋ1		*loeng*^{4}
"cool"			
"cold"	*daaŋ6*		*laang*^{5}*/ hon*^{4}
	kat4	(*pən*^{1} */ tʊŋ*^{3} 'freeze')	*dung*^{3}

Figure 8. Some non-basic temperature adjectives in Southern Zhuang, Southern Pinghua and Cantonese.

Proto-Tai and Old/Middle Chinese share several temperature or temperature-related words, but the directionality of borrowing is difficult to determine. For instance, Proto Southwestern Tai *ʔunᴮ 'warm' is very similar to Middle Chinese 溫 *ʔwʌnᴬ 'lukewarm' (but the tones do not match). There have also been borrowings at later stages. For instance, Southern Zhuang has borrowed *luŋ1* 'cool' from a Sinitic language, while Southern Pinghua has borrowed *jən*^{1} 'cold' from a Tai language (c.f. Lao *jên3* 'cool'). There is the Southern Pinghua basic term *lat*^{5} 'tactile hot' and the Cantonese non-basic term *naat*^{3} 'painfully tactile hot', which are perhaps related to Southern Zhuang *dut5* 'hot', or Lao *daat5* 'singe, score' (but see footnote 4).

This study has shown that the forms of some of these temperature terms were borrowed. However, the ways in which the temperature continuum is divided do not show strong resemblance across all of the languages. While all four languages have terms that can be roughly translated as 'hot', 'warm', 'cool' and 'cold', Southern Zhuang has a tactile versus non-tactile distinction for both heat and cold, Southern Pinghua has a tactile versus non-tactile distinction for 'hot', and the other two languages make no such distinction with their basic temperature terms. Nonetheless, it is perhaps still remarkable that all four languages have at least four basic temperature terms, as opposed to Mandarin, another Sinitic language, which is said to have two basic temperature terms (Sutrop 1999: 187; see also discussions in Section 5.1 and Section 5.2). The frequency of usage of the terms within the same system could differ. For instance, *nyun*^{5} 'warm' in Cantonese is less used than the other basic temperature terms as its semantic range is narrower: only heat that does not have any hint of unpleasantness is *nyun*^{5} (whereas *loeng*^{4} 'cool' is simply a lesser degree of *dung*^{3} 'cold'). (The same could be said of *nun*^{5} in Southern Pinghua.)

The basic temperature terms are mostly one-place predicates. Some can function as causative verbs. The basic temperature terms in Lao also have

other two-argument uses: a) theme being subject and stimulus being object, and b) "whole" being subject and "part" being object. The ambient-personal-tactile distinction is on the whole not reflected in the morphosyntax. For instance, an expression like *man2 naaw3* (3SG cold) in Lao can have either personal-feeling or tactile interpretation. (However, grammatical constructions can force certain interpretations. For instance, the adversative suffix *-can*^{1} in Cantonese describes personal affectedness in general, and hence it describes personal feeling temperature when used with temperature terms.)

Most temperature adjectives can be freely modified. One major restriction is that *nun*^{5} 'warm' in Southern Pinghua and *nyun*^{5} 'warm' in Cantonese are rarely modified by adverbs meaning 'too much'. In these languages, "warm" only signifies comfortable weather; "warm" temperature that is uncomfortable is described as "hot" (*ɲit*^{5} 'non-tactile hot' or *lat*^{3} 'tactile hot' in Southern Pinghua, *jit*^{6} 'hot' in Cantonese). In all four languages, one prominent way that the temperature adjectives are modified is with expressives. For instance in Southern Zhuang, from *tot5* 'cold' is the expressive form *tot5 cit4-cit4*, from *thau6* 'warm' there is the expressive form *thau6 jom6-jom6*.

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There are some interesting facts which are associated with these languages being spoken primarily in the tropics and subtropics. In Lao, which is mostly spoken in the tropics, there is no monomorphemic word for 'ice'. We have also seen that with Cantonese, whose Chinese ancestors came from Northern China where the climate is much colder, there are clear signs that terms associated with extreme coldness became 'less cold'. For instance, *dung*^{3}, which is 'freeze' in most other Sinitic languages, is 'cold' in Cantonese, and *syut*^{3} 'snow' often means 'ice' instead. (Interestingly, the same changes have not occurred in Southern Pinghua, which is spoken around the same latitudes, and their Chinese ancestors also came from Northern China. One possible explanation is that Southern Pinghua has been much more strongly influenced by Mandarin than Cantonese.) It would be interesting to conduct more studies on the effect that mass migration into different climatic zones has on the temperature system of the migrating languages.

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Appendix

Romanisation of Lao follows that in Enfield (2007). The symbols used are as IPA except: a) consonants: *ph th kh* /pʰ tʰ kʰ/, *b d* /ɓ ɗ/, *ñ ng* /ɲ ŋ/, *q* /ʔ/; and b) vowels: *ê* /e/, *è* /ɛ/, *e* /ə/, *ò* /ɔ/, *ù* /ɯ/, geminate symbols represent long vowels. The tones are: *1* mid level, *2* high rising, *3* low rising, *4* high falling, *5* high falling, (unmarked) toneless. Correspondence with Proto-Tai tones:

	*A	*B	*C	*D^{short}	*D^{long}
*ASPIRATED	*3*	*1*	*5*	*2*	*5*
*UNASPIRATED			*4*		
*VOICED	*2*			*1*	*4*

For Southern Zhuang, the transcription used are as IPA except: *ph th kh* /pʰ tʰ kʰ/, *b d* /ɓ ɗ/, *c* /tʃ/. The tones are: *1* mid level, *2* mid falling, *3* high falling, *4* mid rising, *5* low rising, *6* low level. Correspondence with Proto-Tai tones:

<table>
<tr><td></td><td>*A</td><td>*B</td><td>*C</td><td>*D^{short}</td><td>*D^{long}</td></tr>
<tr><td>*ASPIRATED</td><td rowspan="2">4</td><td rowspan="3">5</td><td rowspan="3">6</td><td rowspan="2">4</td><td rowspan="2">5</td></tr>
<tr><td>*UNASPIRATED</td></tr>
<tr><td>*GLOTTALISED</td><td rowspan="2">1</td><td rowspan="2">1</td><td rowspan="2">2</td></tr>
<tr><td>*VOICED</td><td>2</td><td>3</td></tr>
</table>

Transcription of Southern Pinghua follows that in de Sousa (in prep). The symbols used are as IPA. The tones are: *1* high falling, *2* mid level, *3* high level, *3'* high rising, *4* low level, *5* low rising, *6* low level. Correspondence with Middle Chinese tones:

	*A	*B	*C	*D

*ASPIRATED	*1*	*2*	*3'*	*2*
*UNASPIRATED			*3*	
*VOICED NASAL	*4*	*5*	*6*	*5*
*VOICED ORAL				*6*

In addition, some obstruent-ending syllables have tone 3 (high level); these are inevitably expressives or loanwords.

Jyutping is used for romanisation of Cantonese in this paper. The symbols used are as IPA except: a) consonants: *b d g gw z* /p t k k^w ts/, *p t k kw c* /p^h t^h k^h k^{wh} ts^h/, *ng* /ŋ/; and b) vowels: *aa* /a/, *a* /ɐ/, *e* /ɛ/, *o* /ɔ/, *oe* /œ/, *eo* /ɵ/, *yu* /y/. The tones are: *1* high level, *2* high rising, *3* mid level, *4* low falling (or extra low level), *5* low rising, *6* low level. Correspondences with Middle Chinese tones:

	*A	*B	*C	$*D^{short}$	$*D^{long}$
*VOICELESS	*1*	*2*	*3*	*1*	*3*

*VOICED	*4*	*5*	*6*	*6*

Correspondence of tones between Proto-Tai and Middle Chinese: *A = *A, *B = *C, *C = *B; *D = *D respectively.

Reconstructions of Middle/Old Chinese are from Baxter (1992) and Baxter and Sagart (n.d.). Reconstruction of Proto-Tai is from Pittayaporn (2009), except when indicated as from Li (1977).