HOMORGANIC NASAL/STOP ALTERNATIONS IN CANTONESE

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1. Introduction

Cantonese is traditionally considered a phonologically conservative member of the Chinese language family. As in many other conservative members of the Sino-Tibetan language family, nasals and stops are the only possible final consonants in closed syllables, and syllables with stop finals belong to a separate tone category, variously known as entering tone, D-tone, or clipped tone. The possibility of productive morphological derivation by tonal contrast in Chinese has been raised by many authors: Downer (1958), Pullyblank (1962, 1973), Mei (1970), Maspero (1935), Zhao (1958), Yu (1948), Simon (1972), Kam (1977), Wang (1957), and T'sou (1971, 1972). Similar processes have also been reported in languages that are related to, or closely associated with Chinese: Maran (1971), Henderson (1965), Prapin (1977), and Matisoff (1975).

This paper attempts to explore a distinct and sizable class of groups of semantically related monosyllabic words which contrast with each other within each group by means of homorganic nasal/stop alternation of the final consonant. While the same problem may be alternately stated in terms of tonal contrast between D-tone (i.e. the class of syllables ending in -p, -t, -k) and other tones, we shall attempt to show that the homorganicity of the consonantal contrast provides a better basis for contrast by natural classes, and for historical reconstruction.

A narrow phonetic transcription of Cantonese will be used in this paper and tone categories will be cited. The major tone categories are 'ping' (level), 'shang' (rising), 'qu' (departing) and 'ru' (entering), and each may be divided into at least two sub-categories of high and low. There are primarily six tone contours which are listed below next to the tone categories:

A1	High-level (or high falling)	⌐ 55 or ⌐ 53	
A2	Low-falling	⌐ 21 or ⌐ 22	
B1	High-rising	⌐	
B2	Low-rising	⌐	
C1	Mid-level	⌐	
C2	Low-level	⌐	

D1a	High-level	⌐
D1b	Mid-level	⊣
D2	Low-level	⊣

2. The analysis of data

In Tables I to III data on two kinds of word groups are provided. The first will be those all of whose members are not exclusively Cantonese morphemes but are Pan-Chinese morphemes, having established characters, which could be checked against historical sources and re-constructed forms. The second will be groups which have members indige-neous to spoken Cantonese only, and for which there are usually no established written characters. These examples of semantically related morphemes are by no means exhaustive.

2.1 The phonological alternation

It is clear from these examples that a covariant of the semantic variation in each pair or group of morphemes is phonological alternation. The most apparent morphophonemic alternation is that between syllabic final homorganic nasals and stops. The alternation in tonal categories between tones A, B and C on the one hand, and tone D on the other, the so-called Yang-Ru Alternation, is readily predictable on the basis of the segmental differences and appears to be subordinate to segmental phonology. This is enhanced by the fact that the majority of examples have similar or matching pitch contours in Cantonese (though of course, Tone D, to which exclusively belong checked syllables, has shorter duration on account of the final unreleased stops). The generalization concerning matching pitch contours cannot be neatly captured by postulat-ing a basic alternation of tonal categories. Other than the fundamental morphophonemic alternation between final nasals and stops, there is also some evidence that aspiration of initial consonants may be a second or secondary feature in the morphophonemic alternation:

Table I	6.b.1	tsɔk
	6.b.2	ts'ɔk
Table II	5.a.1	pin
	5.a.2	p'in
	11.a.1 & 2	tyn
	11.a.3	t'yn
Table III	5.a.1	tsɛm
	5.a.2	ta'am

Other possible alternations in the initial consonant include [k]
∿ [h] ∿ [∅] and[k]/[t] ∿ [tsʻ]/[ts]:

Table III	14.a	hem		
	14.b.1	hep		
	14.b.2	kep		
Table II	16.b	kʻin		
	16.c	kʻit		
		kin	(to see, to be visible)	
		hin	(to be visible)	
		in	(to appear, to reveal, to be visible)	
Table II	8.a	kin		
	8.b	tsʻit		
Table III	10.a	tim		
	10.b.1 & 2	tsip		

Table I: [-ŋ] ∿ [-k] alternations

PAN-Chinese

		Tone	Character	Gloss
1.a	kʷɔŋ	B1	廣	to be wide, big; far-ranging
b	kʷʻɔk	D1b	擴	to widen, to expand

The more common pronunciation of (1.b) is kʷʻɔŋ in Cantonese, but
kʷʻo in Mandarin and other dialects which contrast with (1.a).

2.a	maaŋ	A2	盲	to be blind
b.	maak	D1b	陌	to be unfamiliar, unclear
3.a	tsʻuŋ	A1	匆	to be in a hurry
b	tsʻuk	D1a	促	speedy

		Tone	Character	Gloss
4.a	tsɛŋ	C2	鄭	careful, serious
b	tsaak	D2	擲	to throw

Cantonese only

		Tone	Character	Gloss
5.a	t'uŋ	A1	通	through passage (stative verb)
b	tuk	D1a	(揢)	to poke
6.a	tsɔŋ	C1	撞	to strike at an object
b.1	tsɔk	D2	凿	to chisel (i.e. repeated strikes), (n) chisel
b.2	ts'ɔk	D1b	(觸 ?)	to shake loose something with force (i.e. to strike with sudden force)
7.a	fiŋ	C2	⌐(拚 ?)	swinging (stative); to fling away
b	fik	D2	(咻 ?)	swinging (stative); to swing an object without the intention of having it leave the hand

The following pairs are found in the Siyi dialects and in some of the Hakka dialects in Canton province.

		Tone	Character	Gloss
8.a	liŋ	A1	(拎 ?)	to carry (by hand)
b	lik	D1a		to carry (by hand)
9.a	ts'iŋ	C1	抨	to pick up manually [< 秤 scale]
b	ts'ik	D1a		to pick up manually

In both (8) & (9) the nasal members (a) are thought to be more basic by native speakers. Their use is less restricted than the obstruent members (b). Thus, in a situation where a complaint has been lodged that an item is too heavy, it is acceptable for the hearer to say daŋ ŋɔ līŋ yāt līŋ or daŋ ŋɔ ts'īŋ yāt ts'īŋ [yāt = one] "let me have a try at carrying it/ picking it up" but not daŋ ŋɔ līk yāt līk or ts'īk yāt ts'īk. Moreover, it is possible if not probable that (8) & (9) are modern reflexes of an earlier morpheme in the archaic language which had initial clusters *kl, *gl, etc. (9.a) also belongs to the same word family as 秤 ts'iŋ "scale", the hand-held scale.

		Tone	Character	Gloss
10.a		C1	揨	to discard; to throw
b		D1b		to chase away

		Tone	Character	Gloss
11.a.1	maaŋ	A1	(繃 ?)	to be tightly stretched (surface)
a.2	meŋ	A1	(猛)	to pull; to pull tight (linear)
b	maak	D1	(擘)	to open up by stretching, splitting

(11.a.1) is commonly used as a semi-bound morpheme co-occurring with [keŋ] 緊 "tight".

		Tone	Character	Gloss
12.a	p'uŋ	C1	哐	to knock, collide
b	p'uk	D1a	(仆)	to fall unexpectedly (as in "drop dead")

Table II: [-n] ∿ [-t] alternations

PAN Chinese

		Tone	Character	Gloss
1.a.1	saan	B1	散	to be in a state of dispersal
a.2	saan	C1	散	to bring a gathering to a close; to disperse
b	saat	D1b	撒	to scatter
2.a	kin	A1	堅	to be strong, solid
b	kit	D1b	結	to enter into solid union; to solidify
3.a	lin	A2	連	to be serially connected; to connect, include
b	lit	D2	列	to enumerate; to arrange; to distribute
4.a	pin	C2	辨	to discern
b	pit	D2	別	to separate, to distinguish

(4.a) and (4.b) are usually found together in modern written Chinese to mean "to discern".

		Tone	Character	Gloss
5.a.1	pin	A1	邊	edge, periphery
a.2	p'in	A1	遍	distant, out of the way

		Tone	Character	Gloss
b	pʻit	D1b	撇	to cast aside
6.a	sin	C2	羨	to be envious; to covet
b	sit	D1b	竊	thief, theft
7.a	tsʻin	A1	遷	to change location
b	tsʻit	D1b	撤	to remove; to retreat
8.a	kin	C1	建	to stand, to erect; strong
b	tsʻit	D1b	設	to establish
9.a	pun	A1	搬	to change location, to move, relocate
b.1	put	D2	撥	to move with finger or instrument, to remove; to distribute
b.2	pʻut	D1b	潑	to splash (water)
10.a	fun	A1	寬	broad
b	fut	D1b	闊	wide, widely apart, separated

(10.a) is used to indicate breadth for both concrete and nonconcrete nouns (e.g. broad-minded, versus loose-fitting clothes) whereas (10.b) is restricted to concrete subjects only (e.g. river, clothing).

		Tone	Character	Gloss
11.a.1	tyn	C2	段	a section
a.2	tyn	C2	斷	segment; to segment; to break off
a.3	tʻyn	B2	斷	to break off; to be broken
b	tʻyt	D1b	脫	to remove; to break off

(11.a.2) and 11.a.3) is used in mainly idiomatic expressions: bet tyhn (Cantonese colloquial: mh tyn) (no break) "unceasingly" tyhn lun (break discussion) "discussion". (11.b) is commonly used with lei to mean "break off" in the modern language.

		Tone	Character	Gloss
12.a	kɔn	A1	乾	to be dry
b	hɔt	D1b	渴	to be thirsty, to be in earnest
13.a	tsin	B1	剪	scissors; cutting instrument; to cut
b	tsʻit	D1b	切	to cut

| 14.a | haan | C2 | 限 | limit; to limit |
| b | kaak | D1b | 隔 | to partition, separate |

Even though in Cantonese a final [-t] is expected instead of [-k] in (14.b), the strong relationship between (14.a) and (14.b) suggests that (14) constitutes a pair.

Cantonese only

| 15.a | sin | C1 | | slippery |
| b | sit | D1b | 洩 | to break; to lose something (in a translation) |

16.a	kin	C1	見	to be visible
b	kʻin	B1	(掀)	to expose; to turn (a page); to open
c	kʻit	D1b	揭	to lift high, to raise, to divulge (information)

| 17.a | kin | A1 | 堅 | solid |
| b | kit | D2 | (杰) | to be thick (in liquids) |

(17.b) means "thick" only in the Cantonese dialects. Thus, in comparison with (2.b) the range of meaning in Cantonese is greater than that in other Chinese dialects.

| 18.a | wɐn | C1 | | to confine |
| b | wɐt | D1b | (屈) | to confine or be hidden for a substantial period of time |

A stowaway on a ship is referred to in Cantonese as a wɐ̄t-sæ [confined-snake].

| 19.a | tʻaan | A1 | (滩) | a stretch of flat objects (e.g. beach); to spread out |
| b | taat | D1b | (撻) | to spread out oneself physically by throwing oneself down onto a flat surface; to throw down an object |

| 20.a | laan | A2 | 欄 | railing, fence; to obstruct |
| b | laat | D1b | (勒 ?) | to obstruct |

(20.a) is used as a verb by itself. When used as a noun in the Taig dynasty, it was a mono-syllabic morpheme:欄 du-zi-mo-peng-<u>lan</u> "Let me not lean on the <u>railings</u> by myself". In modern Chinese it occurs as a bound morpheme in a near-synonym compound: laan-kon 欄杆 [railing + bamboo pole] "a railing baluster".

21.a	kʷen	C1	棍		stick
b	kʷet	D1	掘 ∿ 搰		to dig with an instrument; to be blunt
22.a	saan	A1	閂 ∿ 拴		latch; to latch (a door), to close (a door)
b	sœt	D1a	〔摔 ∿ 榨〕		to latch; latch

In the modern Chinese dialects, the most common morpheme used in reference to closing a door is <u>kʷaan</u> 關 , which was originally a gate in a walled city. kʷaan refers to only closing a door without definite reference to also putting on the latch. On the other hand, saan and sœt include also putting on the latch, and this reference is most clear for sœt. If a door is not closed tightly, one could request a correction of the situation by using either saan or kʷaan (and there could be no latch on the door or gate). If sœt is used, it can only refer to the latch on the door or gate. While the vocalic correspondence between these two alternants is not regular, their semantic relationship quite clearly indicates that both belong to the same word family.

23.a.1	kaan	C1	間	stripe, line for demarkation
a.2	haan	A2	限	bar, barrier
b	kaak	D1b	隔	to partition, separate

The alternation between final [-k] and final [-n] in this set of data is irregular but their semantic relationship is clear.

Table III: [-m] ∿ [-p] alternations

<u>PAN-Chinese</u>

		Tone	Character	Gloss
1.a	him	C1	欠	to owe, to be lacking; apology
b	hip	D1b	歉	to be apologetic
2.a	kim	A1	兼	to include, add
b	kip	D1b	夾	to insert (between...); to include

In Mandarin (2.b) has only the meaning of "to include".

3.a	t'im	A1	添	to increase
b	t'ip	D1b	貼	to supplement; to adhere

(3.b) is semantically more complex than (3.a) for "to supplement" implies deficiency whereas (3.a) "to increase" does not.

4.a.1	kaam	A1	監	to inspect, to supervise; jail
a.2	kɛm	C1	禁	to be placed under confinement; to prohibit
b	aat	D1b	押	to escort (to jail)

The right component of character in (4.b) kaap is noteworthy. There is no clear explanation, on the basis of morphophonemic evidence, and graphical evidence, for the final [-t] appearing in (4.b). The dropping of the initial velar is also noteworthy, for in another member of this word family there is a velar nasal initial in Cantonese: ŋaap D2 "duck". (4.a.1) and (4.a.2) commonly appear together, to form a near-synonym compound meaning "to be jailed".

5.a.1	tsɛm	A1	針 ~ 鍼		needle
a.2	ts'ɛm	A1	侵		to encroach upon; to invade
a.3	ts'aam	A1	參		to join, infiltrate
b	ts'aap	D1b	插		to insert
6.a.1	k'im	B1	鉗 ~ 鋏		tweezers
a.2	k'im	C2	鉗		to pick something up with tweezers
b	kip	D2	挾		to squeeze, to pinch
7.a.1	im	A2	鹽		salt
a.2	im	A1	閹		to castrate
b	ip	D1b	醃		to marinate
8.a	taam	A1	擔		to shoulder
b	taap	D1b	搭		to entrust something to the care of another person

Cantonese only

9.a	tim	B2	玷 ~ 掂		to be in physical contact, to touch
b	tip	D2	疊		to stack (vertically)

10.a	tim	B2	拈 ~ 掂	to be touching, to touch
b.1	tsip	D1b	摺	to fold
b.2	tsip	D1b	接	to meet, to welcome

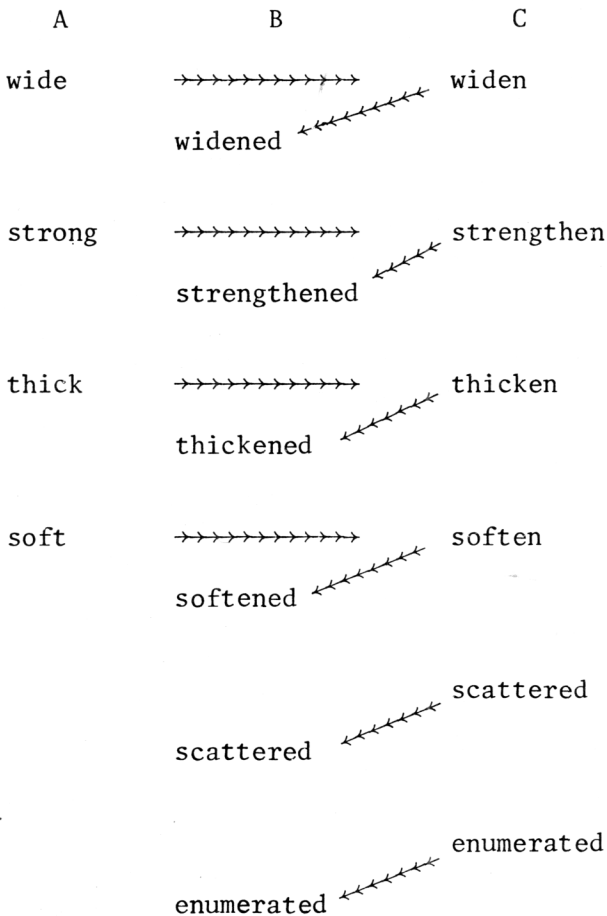(10.b.1) is found in Thai with the meaning of "pleats" as in a "pleated skirt".

11.a	laam	B2	(攬 ?)	to embrace (physically)
b	laap	D1b	(擸 ?)	to hold together; to grasp; to grab (i.e. embrace in the metaphorical sense)

12.a.1	tem	C1		drooping
a.2	tem	A1	(馱)	to delay; to string along
a.3	taam	A1	(馱)	to delay, to waste (time)
b	tep	D1a		to cause to droop

(12.a.2) can be interpreted as a metaphorical extension of (12.a.11). (12.a.3) is used in modern written Chinese.

13.a	k'em	B2		to cover, to conceal
b	k'ep	D1a	(蓋)	to cover up metaphorically or literally (i.e. replace cover of a container)

14.a	hem	C1		tightly closed; to be close to the edge
b.1	hep	D2	(合)	to join, to close
b.2	kep	D2	(蓋)	to join, to include

15.a	tem	B1	(揼)	to throw; to throw (punches), to hit
b	tep	D2	(哾)	to hit (with hand or instruments, e.g. hammer)

16.a	sim	B1	(閃)	to avoid
b	sip	D1b	(銡)	to slip in; to conceal

17.a	lem	C1	溓	to stack from bottom up; a stack
b	lep	D1a	(拉)	to pull a net or shirt (sweater) from the top down so as to enclose the object (body) snugly

2.2 Semantic alternation

It can be readily seen from the data that there are several kinds of internal semantic relationships among members of the pairs or groups of morphemes. The first pertains to the interrelationship between a simple semantic state and the processes or actions by which such states are, or could be brought about. Consider the following examples from English:

A	B	C
wide	→→→→→→→→→→→	widen
	widened ↞↞↞↞↞↞↞	
strong	→→→→→→→→→→→	strengthen
	strengthened ↞↞↞↞↞	
thick	→→→→→→→→→→→	thicken
	thickened ↞↞↞↞↞↞	
soft	→→→→→→→→→→→	soften
	softened ↞↞↞↞↞↞↞	
		scattered
	scattered ↞↞↞↞↞	
		enumerated
	enumerated ↞↞↞↞↞	

Column A refers to a simple or primitive semantic state, while column B refers to the same state which has resulted from change (i.e. a changed state). Column C commonly refers to the action or activity that causes or produces the change in state. In English the causation may be implied and Column C may be inchoative causative or an inchoative (e.g. "The road widens after this bend"), or a resultative or resultative causative (e.g. "The glass broke yesterday" and "Bill broke the glass yesterday").

It is clear from the English examples that the semantically more complex (causative) form is also the morphological more complex form. The following examples from the Cantonese data show that the semantically more complex causative form ends in a stop:

kʷɔŋ	∿	kʷʻɔk	[widen/widen]	(I.1)
tʻuŋ	∿	tuk	[through passage/poke]	(I.5)
saan	∿	saat	[dispersed/scatter]	(II.1)
kin	∿	kit	[be solid/solidify]	(II.2)
lin	∿	lit	[connected/enumerate]	(II.3)
pʻin	∿	pʻit	[distant/cast aside]	(II.5)
kin	∿	tsʻit	[be erect/establish]	(II.8)
kin	∿	kʻit	[visible/devulge]	(II.16)
kin	∿	kit	[be solid/thicken (liquid)]	(II.17)
tim	∿	tip	[touching/to stack]	(III.9)
tɛm	∿	tɛp	[drooping/to drop]	(III.12)
hɛm	∿	kɛp	[closed/to cover]	(III.14)

On the basis of examples such as these it will be reasonable to postulate a rule which derives a causative verb from a stative verb by changing the final nasal of the base to a homorganic stop.

It is interesting to note that for a single state, it may be possible to utilize different processes to obtain that state. Consider the following word family:

tim	"to be touching,	→	tip	"to stack"	(III.9)
	to be in contact"	→	tsip	"to fold"	(III.10)
		→	tsip	"to meet"	(III.10)

tip "to stack" represents a process of vertical stacking so that objects come into contact on the vertical plane; tsip "to fold" represents a process by which a stretch of non-rigid object may be pleated so that the folds come into physical contact. In contrast to tip this process is characteristically viewed in the horizontal plane. tsip "to meet" represents an extended and non-literal interpretation of tsip "to fold", for the participants in the encounter come into at least visual contact. The contrast between similar processes/actions on the vertical and horizontal planes is not particular to this set of examples. This distinction is also manifested generally in other ways in Cantonese. For example, in the nominal classifier system in Chinese the proper choice of

a certain classifier for a noun is determined by whether the object
represented by the noun is typically in a horizontal or vertical
position. Consider the following examples:

Vertical	Horizontal		
X	-	tuŋ	(as in a 'stack' of dishes')
X	-	taap	(as in a stack of cards)
X	-	tsɔ	(as in a multi-storied building)
-	X	paai	(as in a row of dishes)
-	X	laat	(as in an uneven row of cars)
-	X	hɔŋ	(as in a row of trees)

These nominal classifiers generally pertain to $\begin{bmatrix} +\text{entity} \\ -\text{exact} \end{bmatrix}$ measure and
the geometrical orientation of the collective measure is independent of
the geometrical orientation of the constituent nouns. Thus while tuŋ
may be used to refer to a (vertical) stack of dishes, paai may be used
to refer to a (horizontal) row of dishes regardless of whether the dishes
are lying flat or standing vertically. (The difference between tuŋ and
taap is that of thickness of the objects.) Similarly, hɔŋ may be used
to refer to trees regardless of whether they are standing or fallen trees.

In the examples of causative derivations, there appears to be
another less obvious but nonetheless parallel case in (II.17) [kin/kit]
and (II.8) [kin/tsʻit]. kin in both II.17 and II.13 are allofames, i.e.
originating from the same word-family, for their core meanings "to be
strong" and "to be solid" are basically synonymous. On the other hand,
kit (II.17) "to be thick, (liquid)" is unmarked as to whether the event
is taking place on the vertical or horizontal plane, but tsʻit "to
establish, to erect" (II.8) is clearly marked for the vertical plane.

2.3 Derivation of instrumental causative

A second kind of internal relationship among morphemes pertaining
to Instrumental Causative is relevant to these examples. It may be
observed that there are two processes by which an instrument and its
associated action may be structurally related in language. For example
in English when a ship is the means of transportation for goods, the
merchandise has undergone a change in location-state and it is said to
be *shipped*. Other parallel cases in English may be exemplified by the
following transitive verbs: *truck, stick, needle, salt, latch, laddle,
knife,* etc. On the other hand when an instrument is customarily used
in or for a particular action, the instrument may be named after the
action: cut/cutter, clean/cleaner, strip(v)/stripper, peel(v)/peeler,
scrub/scrubber, erase/eraser, light(v)/lighter, etc. There is a funda-
mental difference between these two kinds of derivations. In the latter

case, the derived noun is the cognate instrument for the verb, whereas
in the former case the cognate instrument of the derived verb need not
be the noun. For example, it is possible to *ship* merchandise by *truck*
or by *post,* to *stick* someone with a *knife* or a *gun,* or to *needle* someone
with incessant *complaints* etc. In these examples, a truck is not a
ship, and a knife or a gun is not a stick. The *truck* and the *ship* are
examples of means for transportation, which is the basic common denomina-
tor. *Knife* and *gun* as instruments in the action of 'striking' are, like
sticks, instruments used in actions whose basic common denominator is
idiomatized as 'stick'. In contrast to these, examples in the latter
group are different. Thus for example, *cutter* is the general (generic)
designation for all instruments used in cutting (knife, glass, etc.)
and *cleaner* is the general (generic) designation for all agents used in
cleaning (detergent, soap, or a human agent, etc.). In general, both
semantic considerations and derivational morphology in English provide
many clues for distinguishing between the base form and the derived
form.

Similarly, verbal forms may be derived from nouns to indicate
location or state. For example one common means is by prefixation:
prison ∿ imprison, print ∿ imprint, danger ∿ endanger, line ∿ delineate,
part ∿ impart, plant ∿ implant, port ∿ import, dent ∿ indent, fold ∿
enfold, grain ∿ ingrained, stall ∿ install, tone ∿ intone, balm ∿ embalm,
bed ∿ embed, body ∿ embody, power ∿ empower, case ∿ encase, act ∿ enact,
camp ∿ encamp, chain ∿ enchain, courage ∿ encourage, crust ∿ encrust,
franchise ∿ enfranchise, list ∿ enlist, rage ∿ enrage, shrine ∿ enshrine,
slave ∿ enslave, tomb ∿ entomb.

Similar examples abound in the Chinese data:

ts'iŋ	[scale]		ts'ik	[to pick]	(I.9)
tsɔŋ	[to strike]		tsɔk	[chisel]	(I.6)
pin	[edge]	p'in	p'it	[to cast aside]	(II.5)
tyn	[segment]	t'yn	t'yt	[to break off]	(II.11)
tsin	[scissor]		ts'it	[to cut]	(II.13)
haan	[limit]		kaak	[to separate]	(II.14)
t'aan	[a stretch]		taat	[to spread out]	(II.19)
laan	[railing]		laat	[to obstruct]	(II.20)
kʷɐn	[stick]		kʷet	[to dig/shovel]	(II.21)
saan	[latch]		sæt	[to close/latch]	(II.22)
kaan	[stripe]	haan	kaak	[to partition]	(II.23)
tsɐm	[needle]	ts'ɐm			(III.5)
		ts'aam	ts'aap	[to insert]	(III.5)

| k'im | [tweezers] | k'im | kip | [to squeeze/pinch] | (III.6) |
| im | [salt] | | ip | [marinate] | (III.7) |

At first glance the direction of derivation in these examples is not clear. Both directions appear to be possible:

NOUN→→→→→→VERB

pin ∿ p'in ∿ p'it	(II.5)
t'aan ∿ taat	(II.19)
laan ∿ laat	(II.20)
kʷen ∿ kʷet	(II.21)
im ∿ ip	(III.7)

VERB→→→→→→NOUN

ts'in ∿ ts'ik	(I.9)
tsin ∿ ts'it	(II.13)
saan ∿ sœt	(II.22)
k'im ∿ k'im ∿ kip	(III.6)

It is noteworthy that the concept of "marinating" ip is unlikely to be more primitive than im (III.7) "salt", just as it is unthinkable that "scissors" tsin are more primitive than "cutting" ts'it (II.13). Consequently the conflict is a serious one, for it will be difficult to pick a single base form and there appears to be no uniformity in the same productive derivational process.

One plausible explanation is that the NOUN→→VERB derivation is the basic process with the noun base having nasal endings, which are replaced by the homorganic stops in the derived verbal forms. The appearance of VERB→→NOUN derivation could be a subsequent analogical process. The plausibility of this explanation is enhanced if we take into consideration the course of cultural development. "Scale", "scissors", "latch", "tweezers/pliers", etc. are artifacts whose appearance in a culture most likely post-date the codifications of concepts such as "salt", "stick", "edge", etc.

We shall return to the question of chronology in a subsequent section. The pair (I.6) tsɔŋ "to strike" and tsɔk "chisel" still remains a notable exception, for the noun form, which will be the base form according to this analysis has a stop ending while the verbal form has

a nasal ending. This apparent switching of categories is not uncommon, as pointed out by Downer (1959) and more recently by Kam (1977).

Table IV summarises the two major types of morphological process discussed thus far. The base form in each case ends in a nasal and the derived form replaces the nasal with the homorganic stop. The difference between whether the base form is a stative verb or a noun

Table IV: Summary of two types of morphological derivation

| [ŋ] ~ [-k]	[-n] ~ [-t]	[-m] ~ [-p]
(I.1) kʷɔŋ ~ kʷʻɔk 廣 擴	(II.1) sàan ~ saat 散 撒	(III.9) tim ~ tip (拈) (攝)
(I.5) tʻuŋ ~ tuk 通 (督)	(II.3) lin ~ lit 連 列	(III.12) tem ~ tep
(I.6) tsɔŋ ~ tsɔk 撞 凿	(II.13) tsin ~ tsʻit 剪 切	(III.6) kʻim ~ kip 鉗 挾
(I.9) tsʻiŋ ~ tsʻik 抒	(II.21) kʷen ~ kʷet 棍 掘	(III.7) im ~ ip 鹽 醃

determines whether the derived verb is of Type A or Type B. Even though many such morphemic groupings may be uncovered, (it is clear that Cantonese offers many more instances of such alternations than written Chinese) it is no longer a productive process, even in Cantonese. The examples are residual items in the lexicon which had been created by a morphological process that is no longer in evidence in the synchronic language.

3. Data from other Sino-Tibetan languages

The Wenling dialect in Chekiang province, which is a Wu dialect, offers certain interesting nasal/stop alternations, as reported in Chao (1964). Historically, the syllabic final consonants have undergone

the following merger:
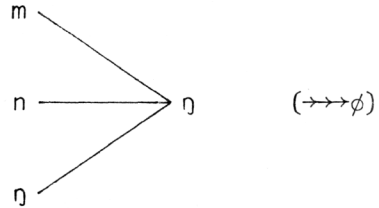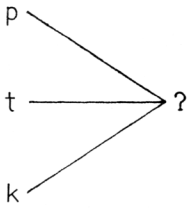
/ŋ/ is further weakened to ⌀ in the environment of certain non-back mid vowels such as /e/ and /ɛ/. In the following tables, Cantonese data is given along with Wenling to facilitate comparison of the final consonants.

Table V: Final consonants in Wenling and Cantonese

	Wenling		Cantonese	
1.	paʔ	paŋ	paak	hundred
2.	ziʔ	ziŋ	sep	ten
3.	pɛʔ	pɛ	paat	eight
4.	tɕʻiʔ	tɕʻiŋ	tset	seven
5.	loʔ	lɔŋ	luk	six
6.	ʔiʔ	ʔiŋ	yet	one
7.	tɕiʔ	tɕiŋ	tsek	classifier
8.	pʻiʔ	pʻiŋ	pet	classifier
9.	foʔ	fɔŋ	fuk	classifier
10.	jeʔ	je	yip	classifier
11.	waʔ	waŋ	fuk	classifier
12.	kɔʔ	kɔŋ	kɔk	classifier
13.	kaʔ	kaŋ	kek	classifier
14.	ɲiʔ	ɲiŋ	yet	classifier
15.	ʔuoʔ	ʔuŋ	ŋuk	classifier

	Wenling		Cantonese			
	Noun	Verb				
16.	zoʔ	zɔŋ	tsɔk	∿	ts'ɔŋ	chisel
17.	ɕyeʔ	ɕye	ts'aat	∿		brush
18.	kɛʔ	kɛ	kip	∿	kim	clip
19.	p'aʔ	p'aŋ	p'aak	∿	p'aan	swat(ter)
20.	bɛʔ	bɛ	pet			pull(er)
21.	zɛʔ	zɛ	tsaap			block/gate
22.	t'oʔ	t'ɔŋ	t'ɔk	∿	t'ɔŋ	carry/harness
23.	loʔ	lɔŋ	lɔk			connect/hemp cord
24.	diʔ	diŋ	tip	∿	(tim)	stack

It is quite clear that two kinds of morphophonemic alternations
are found in Table V. The first type (e.g. V.1-15) pertains to the
reduplication of numerals and classifiers and the obstruent form appears
to be the citation as well as base form. The more interesting second
type (e.g. V.16-22) pertains to alternations between nouns and verbs.
Zhao suggests that the noun form ending in an obstruent is the base form
and his choice is probably based on the first kind of alternation. There
is no clear independent supporting evidence because either the noun or
the verb form may appear independently or as the citation form.

On the basis of our Cantonese evidence we are moved to suggest that
in Wenling the nasal form is also the base form, hence contrary to Zhao.
It may be noted that there is no report of alternation between stative
verbs and derived causative verbs in Wenling comparable to that found in
Cantonese. The data from Wenling is relatively unique though parallels
with Cantonese may be found. Thus Wenling V.16, V.18 and V.24 are
related to Cantonese I.6, III.6 and III.9 (and III.10) respectively.
Other less obvious parallels between Wenling and Cantonese are given in
Table V items 19 and 22. All four Cantonese examples are primarily verbs,
though in contrast to Wenling, p'aak may be a noun as in kau p'aak *racket*
"ball-hitter". p'aan refers to the hitting action exemplified by dusting
clothing; t'ɔk refers to keeping something heavy suspended with one's
hands and t'ɔŋ refers to sliding action.

In the preceding section's discussion on instrumental causatives
the hypothesis was put forward that the noun →→→→ verb derivation is
the more basic process. The same reasons are applicable in the Wenling
case when we consider that analogy could also have brought about the full
paradigm. It is noteworthy that the explanation for the exception in
Cantonese (I.6) tsɔŋ "to strike" and tsɔk "chisel" is supported by

independent evidence from the Wenling data (V.16).

The comparison between Wenling and Cantonese shows that morphological derivation by homorganic nasal/stop alternation remains more peripheral in Wenling and that it contains an additional morphophonemic alternation for the reduplication of numerals and nominal classifiers, which has not been reported for other dialects. The following is a summary of the Cantonese and Wenling alternation.

	Cantonese	Wenling
inchoative	√	X
resultative	√	X
instrumental	√	√
reduplicative	X	√

This comparison, together with the evidence from the written language, which is accepted on a pan-Chinese scale, supports the hypothesis that this alternation is not new to Cantonese but is of considerable antiquity.

Recent studies of the Jingpho dialect of Burmese by Maran have also provided additional evidence from other Tibeto-Burman languages. Consider the following data from Maran 1972:

Table VI: Homorganic stops and nasals in Tibeto-Burman languages

1.	sad	kill	san	dead, lifeless
2.	gad	run	gan	be running
3.	tsud	emerge	tsun	emergent
4.	byab	spread	byam	be far-ranging
5.	grib	smother, stifle	grim	stifled
6.	cig	patch, plug up	cin	be patched, not leaky
7.	mug	obscure (v)	muŋ	obscure (adj.)
8.	thag	retract, recoil	thaŋ	shrunk, retracted

	Written Burmese		North Burmese	
9.	puiŋ	paiŋ	to rule
	puik	pail	to occupy, annex
10.	tuiŋ	taiŋ	territory
	taik	taik	to engage in battle
11.	sok	souk	build
	soŋ	souŋ	structure
12.	lim	liŋ	to roll
	lip	lik	a roll
13.	khym	chuŋ	cluster, clump
	khyp	chuk	to confine to, combine
14.	tum?	tuŋ?	stoop
	tup	tuk	walking stick
15.	khat	khat	put into, dip
	khan	khan	receive

VI.1 to VI.8 are intimately linked to the Chinese examples discussed
in Section 2.2. VI.1 sad "kill" and VI.3 tsud "emerge" may have cognate
forms in Chinese.

The additional comparative evidence from written Burmese and
North Burmese provides further evidence that the process of alternation
between homorganic nasals and stops is rather widespread. It is note-
worthy that derivational morphology in classical Tibetan is a rather
common phenomenon (Simon 1972) and the reconstruction of morphology in
this language family has begun to attract increasing numbers of linguists.

4. Concluding remarks

Evidence has been presented in this paper that the alternation
between homorganic nasals and stops in Cantonese reflects processes of
morphological derivation that are not longer productive. The compara-
tive evidence from written Chinese and Wenling as well as from Tibeto-
Burman languages indicates that the reconstructed alternation was rather
widespread and was of considerable antiquity in this language family.

The reconstructed morphology provided a means for the creation
of some D-tone morphemes which have stop finals, though it remains too
speculative to suggest that this was the means by which all D-tone words
in Chinese were derived.

It was not possible to suggest a narrow time frame within which the morphological process ceased to be productive, though evidence from the writing system provides some interesting clues. It can be seen that the hand *radical* (扌) occurs with high frequency among the derived forms. The best examples are I.1 and II.1. The frequent but not consistent use of this semantic indicator invites the suggestion that the morphological process had at least marginal productivity during the early developmental phase of the radical system in the Chinese written language. Other possible evidence that could help to resolve this question of timing may be drawn from a precise study of the emergence of the versatile periphastic causative construction which replaced the morphological causative.

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