

# Chinese and Swedish Stops in Contrast

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## Abstract

This article is a preliminary overview contrasting Chinese (CN)<sup>1</sup> and Swedish (SE) stops. It begins with a general description of the stop systems of these two languages. The contrastive findings suggest that teachers of Chinese as Foreign Language should pay more attention to training VOT perception instead of the usual intense listening exercises of the tones. Finally, future research on contrastive stops between these two languages is discussed.

## Introduction

All languages have at least two of three consonants [p, t, k] (Gussenhoven and Jacobs, 2005). Both Chinese (CN) and Swedish (SE) obey this universal rule. However, earlier studies on sounds in contrast between these two languages given by Garlén (1988) and Bannert (1994) are still far from complete; the former of these only lists an inventory of CN sounds and the latter's description goes out from the difficulties L1 CN perform when learning L2 SE.

The reason for studying the stops is that L1 Swedish adult learners still can not distinguish the three Chinese stop pairs [p, p<sup>h</sup>], [t, t<sup>h</sup>], and [k, k<sup>h</sup>] even though they already master the CN tones. Secondly, stops will hinder the acquisition of affricates, which are not found in the Swedish phonological system. Thirdly, empirical data<sup>2</sup> has raised a suspicion that wrongly identified tones depend on how the stops are perceived.

This study stresses basic similarities and differences; neither plotting nor spectra tables will be presented.

## The systems of stops in Chinese and Swedish

### Chinese stops

#### Place of articulation

CN has six stops. The official Pinyin transcription is b p d t g k, IPA uses [b p d t g k].

In Table 1 presence of a feature is shown by a [+] and absence by a [-]. The aerial [h] means aspiration. The features [Bilabial],

[Dental], and [Velar] stand for the places of the articulation.

Table 1 Chinese stops – place of articulation

	[p]	[t]	[k]	[p <sup>h</sup> ]	[t <sup>h</sup> ]	[k <sup>h</sup> ]
Bilabial	+			+		
Dental		+			+	
Velar			+			+

#### Manner of articulation

Chinese stops are voiceless on phoneme level. Therefore, the feature [±aspirated] plays a crucial role, or [p, t, k] are unaspirated and [p<sup>h</sup>, t<sup>h</sup>, k<sup>h</sup>] are aspirated.

However, the unaspirated stops [p, t, k] can be replaced by voiced [b, d, g] in an unstressed word (San, 2000). Lin (2007) also points out that: "the consonant undergoing the weakening process is usually in a neutral-toned syllable, or in a second position of a trisyllabic expression".

It is well known that Chinese has four tones plus one neutral tone. When tones are combined the neutral tone only occurs in the second syllable<sup>3</sup>. Modern Chinese words are mostly disyllables (and written with two characters), for instance 篱笆 líba [35li3pa] fence, 弟弟 dìdi [53ti1ti] younger brother. Here, a voiceless stop becomes voiced (voiceless stop→voiced stop), [p→b] in the word 篱笆 líba [35li3pa→35li3ba] fence, and [t→d] in the word 弟弟 dìdi [53ti1ti→53ti1di] younger brother.

### Swedish stops

#### Place of articulation

Also Swedish has six stops. Table 2 presents an inventory of the stop phonemes, [b, d, g] and [p, t, k], respectively. These stops are grouped according to the order of the features: [Bilabial], [Dental], and [Velar] in the table.

Table 2 Swedish stops – place of articulation

	[b]	[d]	[g]	[p]	[t]	[k]
Bilabial	+			+		
Dental		+			+	
Velar			+			+

### Manner of articulation

Swedish stops are, on phoneme level, both voiced and voiceless. Therefore, the feature [±voiced] is prominent, [b, d, g] are voiced and [p, t, k] are voiceless.

Nevertheless, the voiced stops [b, d, g] can be voiceless [p, t, k] depending on in what context they occur. On the other hand, [p, t, k] can be judged by features [±voiced/aspirated] when they in consonant combinations follow an [s]. Elert (2000), Engstrand (2004) and Garlén (1988) have explicated these different phonetic realizations of stops in Swedish, the following examples are adopted from their works: *staben* ['sta:bən] *the staff*, *staden* ['sta:dən] *the city*, and *stagen* ['sta:gən] *the stays* or *labbar* [lab:ar] *do(es) lab work, skuas, and labs*, *laddar* [lad:ar] *load(s)*, and *laggar* [lag:ar] *griddle, waffle iron*. Garlén uses the term absolutely voiced. The stops can also be absolutely voiced in other positions, for example in phrases (*på baren* [po:ba:rən] *in the pub*), and in nasal syllables (*naglar* [na:glar] *nails*).

In absolute initial position (after a pause), the stops are partially voiced like *bal* [ba:l] *ball*, *dal* [da:l] *valley*, and *gal* [ga:l] *crow*. The initial stops [p, t, k] in a stressed syllable are aspirated for instance *par* [p<sup>h</sup>a:r] *couple*, *tar* [t<sup>h</sup>a:r] *take(s)*, and *kar* [k<sup>h</sup>a:r] *tub*. [p, t, k] are also aspirated in some loanwords even though these sounds are placed between two vowels, for examples: *supé* [sɥ<sup>h</sup>p<sup>h</sup>e:] *supper*, *tapir* [ta<sup>h</sup>p<sup>h</sup>i:r] *tapir*, *satir* [sa<sup>h</sup>t<sup>h</sup>i:r] *satire*, and *saké* [sa<sup>h</sup>k<sup>h</sup>i] *Saki*. When [p, t, k] are preceded by an [s] then they are unaspirated, *spar* ['spa:r] *save*, *stal* ['sta:l] *stole*, and *skal* ['ska:l] *shell*. When [p, t, k] are placed between the vowels they remain unaspirated e.g. *rapa* [ra:pa] *belch*, *lotta* [lot:a] *lottery*, *sänka* [sɛŋka] *lower*.

### Two languages' stops in contrast

Table 3. Stops inventory and features in contrast

	p	t	k	p <sup>h</sup>	t <sup>h</sup>	k <sup>h</sup>	b	d	g
CN	+	+	+	+	+	+			
SE	+	+	+				+	+	+
Bilabial	+			+			+		
Dental		+			+			+	
Velar			+			+			+
Voiced							+	+	+
Aspirated				+	+	+			

Table 3 illustrates the stops inventory of the two languages, their places of articulation, and their manners of articulation.

The total of the stops in these two languages is nine in order of unaspirated [p, t, k], aspirated [p<sup>h</sup>, t<sup>h</sup>, k<sup>h</sup>], and voiced [b, d, g]. Both languages share the same places of articulation and have different features in manners of articulation.

### Analogies and opposites

The places of articulation in Chinese and Swedish are the same. They are closely described in Elert (2000), Engstrand (2004), Garlén (1988), Lin (2007), and San (2000).

Table 3 clearly demonstrates that the phonomatic transcriptions [p<sup>h</sup>, t<sup>h</sup>, k<sup>h</sup>] in Chinese have the feature [+aspirated] and oppositely Swedish stops [b, d, g] are voiced.

### Nuances

Table 3 also shows that the phonomatic transcription [p, t, k] is used in both languages. It is plausible that [−voiced] for the stops in Swedish and [−aspirated] for the Chinese ones are equal phonologically. In fact, whether a sound belongs to feature [±voiced] or [±aspirated] depends not only on language but also phonetic realization within a language.

Many factors like physical, physiological, and aerodynamic parameters interfere with the features [±voiced]/[±aspirated]. The V(oice)-O(nset)-T(ime) (see below) seems to be more plausible among these explanations. Since neither aspiration nor voicing is absolute (there are intermediate degrees in both) the relative terms fortis (higher, more positive VOT) and lenis (lower, more negative VOT) are often used to describe a binary opposition between a series of consonants (Ladefoged, 2006 and Roach, 2000.). Being relative these two concepts can in one language mean something different to what it indicates in another (compare definitions used in phonology). The definitions of stops in this article focus only on VOT.

### Typology of VOT

Catford (2001) presents, when comparing different languages (Chinese, English, French, Thai etc.), three different categories of V(oice)-O(nset)-T(ime) and suggests altogether five degrees.

The three categories about the duration of VOT are: a positive VOT (appr. +100 ms),

zero VOT, and a negative VOT (appr. -100 ms).

A *positive VOT* means that a stop shows a voice onset time longer than needed for the release of the oral closure whereas a *negative VOT* indicates that the vocal cords start vibrating before the stop is released. A *fully voiced stop* means that the VOT coincides with the onset of the stop. In a *partially voiced stop* voicing in initial position begins during the closure (occlusion) of the consonant, as in Germanic languages [b, d, g] (except Dutch,).

Catford uses an [h] (in contrast to [h̥]) for indicating the strongest aspiration (+VOT); [◌] means either unaspirated or voiceless (zero VOT). The whole scale, from a positive to a negative VOT (fully voiced), presented in phonological transcription, is /ph, p<sup>h</sup>, ɸ, ɸb, b/ (strongly aspirated, slightly aspirated, unaspirated, slightly voiced, fully voiced).

The duration of VOT and the scale of aspiration and voiced depend on language to language (see also Engstrand 2004, Garlén 1988)

### VOT in contrast

Figure 1 is a modified version of Catford's sketch. The VOT continuum is indicated by a leaning broken line, which only marks VOT values in contrast of phonemes between Chinese and Swedish.

According to this figure, both Swedish and Chinese have aspirated stops. The Chinese aspiration is stronger than the Swedish one. He uses the terms strongly and slightly to describe the differences between the two aspiration systems. Regarding to universal rules it appears more phonetically, on the other side there are different phonological systems within different

languages. Catford (2001:185): "Here we are representing facts about the phonology of these languages rather than about phonetics, we are representing phonological units, or phonemes, as they are called, rather than speech-sounds."

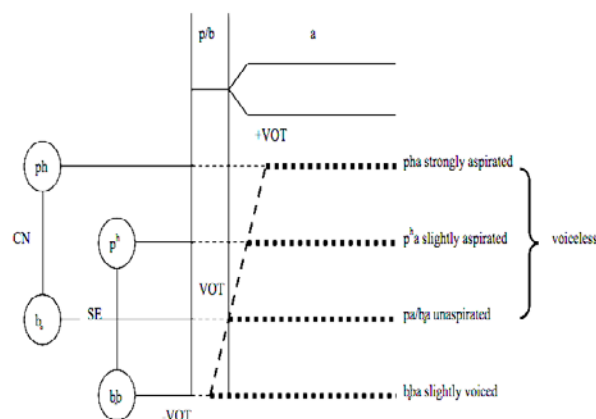


Figure 1. The VOT continuum in contrast

Even though the figure clearly shows that none of the Chinese stops belongs to the category [+voiced], it is still hard to judge what feature should be used due to different phonetic realizations in the two languages.

Table 4 is an overview of phonetic realization with examples in contrast between Standard Chinese (CN) and Swedish (SE). Voicing contrast applies to all types of consonants, but generally aspiration is a feature only for stops and affricates. That's the reason why here the feature [±voiced] is used. Context here means the stop's place in different environments. AI symbolizes absolutely initial position in a syllable, BV stands for stops between vowels within a syllable or in a phrase, and F[s] indicates that an [s] precedes the stops.

Table 4 Phonetic realizations in contrast between Chinese and Swedish

Features	CN	SE	Context			Examples <sup>4</sup>
			AI	BV	F[s]	
-Voiced	ph	+	+			怕 pà <i>fear</i> , 他 tā <i>he/him</i> , 卡 kǎ <i>card</i>
	p <sup>h</sup>		+	+		par <i>pair</i> supé <i>supper</i>
	ɸ		+	+		rapa <i>belch</i> spar <i>save</i>
		+	+		+	八 bā <i>eight</i> , 打 dǎ <i>fight</i> , 生 gǎ <i>naughty</i>
+Voice	ɸb		+	+		bal <i>ball</i> , dal <i>valley</i> , gal <i>crow</i> , resdag <i>travel day</i> 篱笆 líba, 弟弟 dìdi,
		+		+		
	b		+	+		staben <i>the staff</i> , staden <i>the city</i> , stagen <i>the stays</i>

## Significance in practice

[±aspirated] plays an essential role in Standard Chinese: two Chinese stops in connection with exactly both same vowel and same tone are identified solely by the presence/absence of aspiration, for instance 爸 bà [51pa] *father* and 怕 pà [51p<sup>h</sup>a] *fear*, 大 dà [51ta] *big* and 踏 tà [51t<sup>h</sup>a] *stamp*, 瓜 guā [55k<sup>w</sup>a] *melon* and 夸 kuā [55k<sup>h</sup>wa] *boast*.

On the other hand [±voiced] is not prominent for Chinese stops as it is in the Swedish system. This is very important for L1 Swedish learners for the Chinese affricates z [ts]/c [t<sup>h</sup>s], zh [tʂ]/ch [t<sup>h</sup>ʂ], and j [tɕ]/q [t<sup>h</sup>ɕ] are grounded upon these stops, which are not found in the Swedish phonological system (on phonemic level).

Traditionally, teachers of Chinese as foreign language pay more attention to intensive training of Chinese tones than of sounds. Not all syllables have all four tones, for examples we find the twins bā/pā, bǎ/pá, bà/pà, whereas for the third tone bǎ exists but there is no pǎ. Additionally, dá exists but so does not \*tá. One finds both gā, gá, gǎ, gà and kā, ká, kǎ, kà but only in loanwords, e.g. 喀土穆 Kātūmù *Khartoum*, 咖啡 kāfēi *coffee*, onomatopoeia e.g. 嘎嘎 gāgā *quack*, and dialects e.g. 生古 gāgu *peculiar*. Teachers of L2 Chinese have to be aware of this, which perhaps dedicates to perception training.

It still remains to be investigated whether stops interfere with tone perception for learners of Chinese as foreign language. L2 Swedish learners show a tendency to be confused about tones in Chinese disyllabic words. Empirical data show that the misidentified tones mostly occur in syllables with an initial stop or initial affricate, for instances, tǐyàn, T3→T2, guǎngbō, T3→T2, tuōyùn T1→T4. Presence/absence of aspiration seems to contribute to confusion about high/low tone.

## Future research

This is only a basic contrastive study. In fact, how different Chinese and Swedish stops phonetically like VOT, their phonotactics and other perspectives need to be investigated. Another interesting research question is whether Chinese VOT interferes with tone perception in the light of L2 Chinese learners whose language is a non-tonal one. On the contrary, could F0 of the following vowels interfere with the percep-

tion of VOT? If so is the case, what factors could disturb tone perception? Why and how do these factors interfere with tone perception?

## Notes

1. Chinese in this paper indicates only Standard Chinese.
2. The empirical perception data are L1 Swedish learners of L2 Chinese at Gothenburg University
3. The neutral tone is not marked in Pīnyīn.
4. IPA of the examples in Table 4 is eliminated.

## References

- Bannert, R. (1994) På väg mot svenskt uttal, Lund, Studentlitteratur, 23-53.
- Catford, J. C. (2001) A practical introduction to phonetics, Oxford, Oxford University Press, 181-186.
- Elert, C.-C. (2000) Allmän och svensk fonetik, Stockholm, Norstedt, 54-64 and 109-112.
- Engstrand, O. (2004) Fonetikens grunder, Lund, Studentlitteratur, 121-131.
- Garlén, C. (1988) Svenskans fonologi: [i kontrastiv och typologisk belysning], Lund, Studentlitteratur, 20-33.
- Gussenhoven, C. and Jacobs, H. (2005) Understanding phonology, London, Arnold, 3-4 and 26-27.
- Hu, G. and Lindh, J. (2010) Perceptual mistakes of Chinese tones in 2-syllable words by Swedish listeners. Proceedings of TIE 4 – The 4<sup>th</sup> European Conference on Tone and Intonation. TIE-10, 121-122.
- Ladefoged, P. (2006) A course in phonetics, Boston, Mass., Thomson, 151-158.
- Lin, Y.-H. (2007) The Sounds of Chinese, Cambridge University Press, 37-42.
- Roach, P. (2000). English phonetics and phonology: a practical course, Cambridge, Cambridge University Press, 27-37.
- San, D. (2000) The phonology of standard Chinese, Oxford, Oxford Univ. Press, 23-25 and 230-232.