

# HONG KONG CANTONESE L4 LEARNERS' ORAL PRODUCTION OF GERMAN: TOWARDS THE ANALYSIS OF CONSONANT PRODUCTION

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## ABSTRACT

In this study we compare the consonantal production of L4 learners (level A1+B2) with the expected canonical pronunciation and the pronunciation of a German L1 control group. The L4 speakers' source languages are Hong Kong Cantonese (HKC) L1, Hong Kong English (HKE) L2 and *Putonghua*/Mandarin (P) L3. Due to major disparities across the typologically distant language pair Cantonese and German, and due to interaction with L2, the question of phonetic deviations and partial transfer from L1 and L2 is addressed. Data were gathered from eleven adult Cantonese learners reading German texts, together with that of an L1 control group. The analysis reveals various typical consonantal deviations from the underlying canonical form, as well as contexts where L1+L2 transfer effects are identified on phonetic, phonological and phonotactic levels.

**Keywords:** consonants, German L4, partial L1+L2 transfer, [l-n] replacement, /l/ vocalization

## 1. INTRODUCTION

This paper is part of a larger study of salient mispronunciations of Hong Kong Cantonese L4 learners of German, in support of effective pedagogical and remedial instructions for pronunciation improvement [2]. For the typical young adult learners of German of the first post-colonial generation, the source languages are Cantonese (L1), Hong Kong English (L2) and *Putonghua* (L3). Due to major disparities across the typologically distant language pair Cantonese and German, and due to interaction with L2, we hypothesize typical phonetic deviations and partial transfer from L1 and L2 to L4 pronunciation.

For this study we compared the consonantal production of L4 learners (level A1+B2) with the expected canonical pronunciation and the pronunciation of a German L1 control group.

As members of different language families, Cantonese and German display phonetic and phonological features that differ along various tiers of analysis. Unlike German [4, 10, 14], Cantonese [1, 9, 12, 17] is mainly monosyllabic and has a relatively simple syllable structure, no [+voice] feature and a small inventory of fricatives. Major and minor linguistic discrepancies on phonetic, phonological and phonotactic levels across HKC, HKE, *Putonghua* and the target language German may offer an explanatory model to understand the cause of *some* deviations in the consonantal production of these L4 learners of German. We hypothesize that these deviations may be due to a diversity of factors, such as missing phones in L1-L3, missing voicing feature, violation of phonotactic constraints (L1+L2), imperfect perception, or incorrect grapheme-to-phoneme conversion due to negative transfer from L2. In the following two sections the collected data and annotation method are described, followed by a discussion of the findings in Section 4.

## 2. DATA

Eleven female young adult Cantonese L4 learners of German have been selected for recordings in Hong Kong. Their source languages were HKC (L1), HKE (L2) and *Putonghua* (L3). German was their fourth spoken language. Eight informants were beginners (A1) at the Goethe-Institut, and three advanced speakers (B2). The control group was composed of eleven female young adult German native speakers speaking *Hochdeutsch* in Germany. Both groups consist of university students or graduates, without speech disorders or impediments and from the same age group (20-34 years of age). Both groups have read exactly the same text material, consisting of 2344 words or 11121 phones (according to the canonical pronunciation produced by the BALLOON TTS system [13]).

### 3. METHOD

The total time of inspected speech was 1901 sec for the L4 group and 1019 sec for the L1 group. The total number of inspected words and phones in this study is 4688 and 22242 respectively.

All recordings were manually segmented and labelled by a trained phonetician using praat and the results processed automatically. The manually tagged deviation types were: deletion, insertion, replacement, metathesis and deviations related to diphthongs (replacements or monophthongization). In the following the deletion of /x/ is denoted by a following star [x\*], the replacement of /x/ by /y/ is denoted by a dash [x-y], and the insertion of /x/ is denoted by a preceding hash sign [#x].

**Table 1:** Missing German phonemes in learners' L1-L3 (sources: [1, 4, 6, 7, 10, 17]).

L1 HKC	L2 HKE	L3 Putonghua	L4 German
-	(b, d, g) <sup>2</sup>	-	b, d, g
-	-	X	v, z, ʋ, ç <sup>3</sup> , χ <sup>3</sup> , x <sup>3</sup>
-	-	-	pf

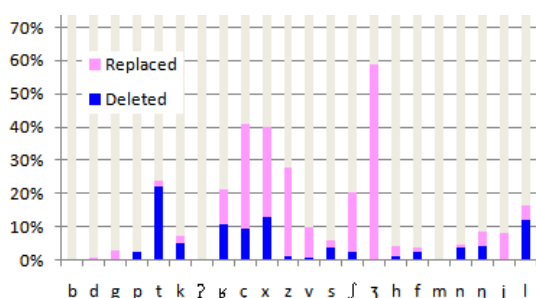
<sup>2</sup> Not truly voiced according to Hung [6].

<sup>3</sup> According to Hall [4], [ç], [x] and [χ] are allophones of /ç/. Kohler [10] suggests that [ç] and [χ] are allophones of /x/. Other linguists regard /ç,χ/ or /ç,x/ as being a phoneme.

### 4. RESULTS

As indicated in the introduction we hypothesize that adult Cantonese L4 learners of German will produce consonants and consonantal clusters with typical errors due to their L1+L2 background. In the following we present and comment evidence from our data. Fig. 1 shows the overall rates of deletions (blue/dark grey) and replacements (red/light grey) for all consonants. If not stated otherwise, the effects described deviate significantly from the German control group (denoted short as 'L1' in the following). As a starting point for our discussion, Tab. 1 displays the German phonemes missing across our informants' L1, L2 and L3.

**Figure 1:** Relative frequency of deletions and replacements of consonants in L4 speech. Comparable rates for the L1 group were negligible.



#### 4.1. Stops

**/b,d,g/:** Whereas German stops such as /p/ and /b/ are distinguished by the contrast in voicing [10], no HKC stops are distinctively voiced, the contrast is rather one of aspiration [1]. In HKE, phonetically, the 'voiced' stops are not truly voiced, and are distinguished in the syllable onset from the 'voiceless' stops by the aspiration and greater delay in voice onset time of the latter [6]. Devoicing of initial /b,d,g/ at the initial state of German L4 could therefore be expected. However, the results suggest that voicing of /b,d,g/ in word initial position is observed, even at level A1. An explanation could be the informants' voicing of stops in L2 or interiorization of voiced stops at an early stage of the learners' interlanguage. In the syllable onset, /d/ is only devoiced twice when final *schwa* is deleted in *schade* [ʃa:d-tʰə\*].

**/p,t,k/:** Regarding initial /p,t,k/, higher VOT values are expected in L4. According to measurements [2], HKC native speakers produce higher VOT (absolute values) than the L1 control group. The results for L4 learners show that 31.0% of 175 word-final stops are deleted, compared to 4.1% in L1. It is assumed that L4 speakers produce unreleased stops, like in HKC [1, 17] and in HKE [6]. L4 learners of level B2 still delete between 19.7% and 25.0% of word-final stops. A clear pattern of contexts where this phenomenon occurs is difficult to establish due to intra- and inter-speaker variability.

[ʔ]: The analysis of 774 initial prevocalic glottal stops shows that none of these are deleted.

#### 4.2. Fricatives

**/ʋ/:** The results for this missing phoneme show that from 345 canonical /ʋ/ 10.7% are deleted, and 10.4% replaced. /ʋ/ is most often replaced by English [ɹ] (5.5%), and rarely by /h/ (2.6%). /ʋ/ is also seldom replaced by [ʔ] in word initial position (1.2%). Our findings support that /ʋ/ is not replaced by /l/, as observed by Kelz [8].

[ç]: This coda allophone is deleted in 9.6% out of 311 canonical realizations, e.g. in *ich* [ʔɪç\*] or *nicht* [nɪç\*tʰ]. L1 speakers delete 0.3%. The replacement rate in L4 is relatively high with 31.2%. The first choice for replacement is [k], e.g. in *ich* [ʔɪç-kʰ], followed by [ʃ].

[χ] and [x]: As SAMPA provides only one symbol for both, the results given here cover both sounds. [χ], a missing sound in L1-L3, and [x], occurring only in the onset in L3, show a

combined deletion rate of 12.9%. Examples are *doch* [dɔx\*] and *acht* [ʔax\*<sup>th</sup>]. L4 speakers present a relatively high replacement rate with 27.1% out of 140 canonical realizations. The L4 group predominantly replace these sounds with /k/, e.g. in *lachen* [lax-k<sup>h</sup>ən] or *Anspruch* [ʔa-a:n]p<sup>h</sup>β-rux-k<sup>h</sup>].

**/z/:** Initial /z/ is very rarely deleted in L4 (1.0% out of 194 canonical realizations), but systematically devoiced at level A1, e.g. in *sind* [z-sm<sup>h</sup>th\*]. Devoicing of /z/ is also observed at level B2, but not in word initial position, e.g. in *glücklicherweise* [g<sup>h</sup>lyk<sup>h</sup>lɪçə\*v-waiz-sə]. By contrast, three L1 speakers devoice 1.6% of word initial /z/, e.g. in *sind* [z-sm<sup>h</sup>th\*].

The replacement [z-ʃ] (9.3%) by L4 speakers of both levels is due to systematic metathesized pronunciation of word final syllable <sisch>, e.g. in *Kantonesisch* [k<sup>h</sup>ant<sup>h</sup>o:ne:-iz-ʃɪf-s], showing an interaction with L2 phonotactic rules.

**/v/:** Based on the results for 202 canonical labiodental /v/ it can be observed that deletion or devoicing is not a strategy of choice for L4 speakers: /v/ is almost never deleted (0.5%), and almost never devoiced (0.5%). The replacement [v-w] (8.9%) observed at both levels, can be explained with L2 grapheme-to-phoneme correspondence, e.g. in *welche* [v-wɛlç-k<sup>h</sup>ə].

**/ʃ/ and /s/:** The fricative /ʃ/ is systematically replaced with /s/ when occurring as first member of an onset cluster, probably due to L2 onset clusters starting with /s/. On the other hand, /s/ is systematically replaced with /ʃ/ as part of metathesis mentioned above.

**/h/:** As expected, initial /h/ is well pronounced in L4. The replacement with [ʔ] is rare (3.1%).

**/f/:** The results show that /f/ is usually well pronounced and only rarely deleted in complex clusters, e.g. in *Zukunft* [tsu:k<sup>h</sup>ʊnf\*<sup>th</sup>-t#s].

### 4.3. Nasals

Initial /m,n/ and final /m,n,ŋ/ are generally well pronounced in L4, except after diphthongs, where deletion is systematic: *nein* [nam\*], *neun* [nɔyn\*] (diphthongs occur only in open syllables in speakers' L1 [1]). The relatively frequent insertion of /n/ in the coda may be due to confusion with a German infinitive verb form, e.g. in *komme* [k<sup>h</sup>ɔmə#n].

### 4.4. Lateral [l]

In HKC, the historical syllable-initial [n-] has unconditionally merged with [l-] [15, 16]. If our informants use -] and [n-] in free variation in their native language and in HKE, they will probably do so at least in the initial state of German L4. It seems interesting that our data show evidence for [l-n] replacements in German L4, occurring both in the onset and coda, such as in *leid* [l-na<sup>h</sup>th\*], *England* [ʔɛŋl-na-ənth\*] and most often in *null* [nɔl-n]. In this study, 4 out of 11 informants (of both levels) consequently replace final /l/ with /n/ in the word *null* (meaning 'zero'). Two informants pronounce the target word *null* one time correctly, one time with phonetic deviation: [nɔl-n] (the meaning is changed, as *nun* means 'now'). As mentioned above, the n/l alternation is observed in HKE (*net* is pronounced *let*, *let* is pronounced *net*). According to Hung [6], /l/ and /n/ are in free variation in the syllable onset in HKE, but are contrastive in other environments. Our results show that /l/ and /n/ are not always contrastive in the onset and coda in L4 productions. /l/ is also deleted in 12.1% of 256 canonical realizations. This occurs mainly in the coda and in clusters. The rare deletion of /l/ in *viel* [fi:-l\*] is observed in the speech production of an advanced L4 speaker, but also in the pronunciation of L1 speakers, a phenomenon probably due to lazy pronunciation.

In L4 there seems to be no evidence for velarized ("dark") voiced alveolar lateral approximant, but we observe the vocalization of cluster/initial /l/ in the coda when preceded by /a/, e.g. in *Fahrkartenschalter* [fa:ɛk<sup>h</sup>æ<sup>h</sup>t<sup>h</sup>ən\*ʃal-ɪ<sup>h</sup>ɐ].

As shown in [2], HKC native speakers tend to vocalize /l/ in coda clusters starting with /l/: /al/+C. From 44 speech productions containing this target sequence, 11 /a/ and 10 /aʊ/ productions were observed in the L4 group.

### 4.5. Approximant

**/j/:** As expected, initial /j/ (61 canonical realizations) is well pronounced in L4.

### 4.6. Affricates

**/pf/:** All B2 learners delete nearly systematically one member of /pf/ in a pre- or postvocalic cluster. In *Pflaumen*, [p] is deleted: [p\*flaʊmən], in *gepflicht* [p] or [f] is deleted: [gəpf\*l\*ɪ\*ɪkt<sup>h</sup>] / [gəp\*fly-ʊk\*<sup>th</sup>], in *schimpfst* [f] is deleted: [ʃimpf\*st<sup>h</sup>\*]. The control group shows no deletions in the production of this affricate.

/ts/: Although /ts/ is present in the learners' L1 and L3 (onset only), the nearly systematic deletion of [t] in the onset by L4 learners is observed, resulting in the production of the second member only, as shown for example in *zwei* [t\*svai] or *Flugzeug* [flu:kht\*sɔŋk<sup>h</sup>\*]. In a coda cluster, /t/ is often deleted: *jetzt* [jet\*st<sup>h</sup>]. One explanation is that word-initial <z> is associated to /s/ in L2, and not to /ts/ like in German.

#### 4.7. Clusters

According to the results, the insertion of [ə] is not a strategy of choice, which is of interest. In most mispronunciations, deletions of missing sounds are often observed. Some /l/ vocalizations in coda clusters have been found.

### 5. CONCLUSION

This paper reports a list of salient consonantal mispronunciations made by adult Cantonese L4 learners of German in Hong Kong. The major sources for phonetic deviations are: missing consonants in L1-L3, final (released) stops, voicing of fricatives, the production of post-diphthongal consonants, L2 and L4 differences in grapheme-to-phoneme correspondence, complex onset and coda clusters different from L2, different sequence orders in English and German leading to metathesis (in order to correspond to L2 sequences). The results suggest that in the speech of some informants /l/ and /n/ are not contrastive, neither in the syllable onset nor in the syllable coda. The vocalization of /l/ in the sequence /al/+C resulting in two patterns of diphthongization needs further investigation.

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