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THE EVOLUTION OF TONES IN PUNJABI[1]

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0.1: Along with Lahnda and the Western Pahari dialects, Punjabi is the only modern Indo-Aryan language which has developed tonal contrasts.

Punjabi has three phonemic tones. The low tone /`/ is characterized as a low-rising tone by Bailey (1915:ix).[2] The high tone is a rising-falling tone; cf. Bailey 1915:ix. The mid tone is never represented, since it is predictable by rules of redundancy; i.e. if a vowel does not bear any tone specification at the level of phonetic representation, it carries a mid tone.

0.2: At the same time, Punjabi has lost the old Indo-Aryan series of voiced aspirates, changing them into voiceless stops, initially, and voiced stops in other environments. Similarly, the Old Indo-Aryan voiced h appears voiceless initially and is lost elsewhere.

Punjabi is largely surrounded by a Hindi speaking region which has retained h and the old voiced aspirated consonants. On the other side of Punjabi, Kashmiri is spoken. In this language, the distinction between voiced aspirates and voiced unaspirates has been neutralized, and as a consequence, the voiced aspirates are realized as voiced aspirated segments in all environments.

0.3: As it turns out, there is a close correlation between the (retained) h and voiced aspirates of Hindi and the Punjabi tones. Thus, in place of Hindi voiced aspirates, Punjabi shows unvoiced unaspirated segments in initial position followed by low tone; and in non-initial position, it shows voiced unaspirated stops either preceded by high tone or followed by low tone. Similarly, after initial h, Punjabi offers low tone; and corresponding to Hindi V h (V), Punjabi shows a sequence without h and with either high tone or low tone on the neighboring vowel(s). Compare the following table of general correspondences. (For examples, cf. Section 1.3.1-2 below.)

Hindi		Punjabi
# bh V	→	# bV
# h V	→	# h V
V [+accent] { bh / h } V	→	V [+accent] { b / ø } V

$$\overset{V}{[-\text{accent}]} \begin{Bmatrix} bh \\ h \end{Bmatrix} V \qquad \overset{V}{[-\text{accent}]} \begin{Bmatrix} b \\ \phi \end{Bmatrix} V$$

$$V \begin{Bmatrix} bh \\ h \end{Bmatrix} \# \qquad V \begin{Bmatrix} b \\ \phi \end{Bmatrix} \#$$

The set of correspondences is uniform throughout the five series, i.e. velar, palatal, retroflex, dental, and bilabial. On the other hand, the Hindi unvoiced unaspirates, unvoiced aspirates, and voiced unaspirates do not show tonal correspondences in Punjabi.

0.4: These correspondences were noticed in earlier descriptions of Punjabi (cf. Bailey 1915, Bloch 1925, Jain 1934, Bahl 1957 a,b, Gill 1960, Arun 1961 and Gill and Gleason 1963) and interpreted as the result of a neutralization of the voiced aspirates with the unaspirated voiceless or voiced stops (depending on the environment) and of the loss of non-initial h. These developments, in turn, were offered as an explanation to account for the emergence of tones in Punjabi.

Such an explanation, however, falls short of a phonetic explanation, since it fails to indicate the phonetic features present in voiced aspirates and h which led to the development of different tones. Bloch (1925) was the only exception in this regard. He attempted to set up a correlation between tones, stressed vowels, and h. However, his paper remained unfamiliar to most linguists, probably because it was in French. I will present Bloch's analysis in detail in Section 1.3.3 below.

0.5: This paper presents an attempt to provide for a more satisfactory explanation of the development of tones in Punjabi. Besides attempting to examine the phonetic factors responsible for the development of tones, it will also examine the question whether the emergence of tones in Punjabi is to be explained as a regular phonetic development, as a 'borrowed' phenomenon, or as the result of mere accident. Finally, the paper addresses the question whether the synchronic derivation of Punjabi tones should be in terms of underlying voiced aspirates and h, and by means of rules mirroring the historical development, or whether tones should be regarded as underlying.

1: The evolution of tones in Punjabi seems to be a rather recent development, due to regular linguistic change.

1.1: Historically, Punjabi developed from Proto-Indo-Aryan. Although Vedic Sanskrit, the earliest Indo-Aryan dialect, had pitch accents,

no correlation can be set up between the Vedic pitch accent and the tones of Punjabi. Moreover, Classical Sanskrit and its off-shoots (Pāḷī, the Prākrits, the Apabhraṁśas, etc.) are non-tonal beyond any doubt. The Vedic pitch accent thus was lost at a fairly early time, making it highly unlikely that the tones of Punjabi are an 'inherited' phenomenon.

1.2: On the other hand, the emergence of tones is not likely to be a 'borrowed' or 'accidental' phenomenon. If the Punjabi tones were indeed a borrowed phenomenon, the Western Pahari dialects and neighboring Tibetan languages (such as Pūrik and lower Kānauri) presumably would have to be considered the source. In that case, the correlation between older Indo-Aryan voiced aspirates and h and Punjabi tones would have to be considered accidental.

However, such an explanation would be unsatisfactory for the following reasons:

(1) It would miss a significant generalization and would have to claim that tones are phonologically unpredictable in the diachronic grammar of Punjabi;

(2) It would fail to relate tones with some other linguistic processes in the grammar of Punjabi, for which cf sections 2 and 3;

(3) Perhaps most importantly, some W. Pahari dialects present an intermediate stage, which Punjabi must have once gone through (cf. 1.3.6). Bailey (1915:ix) noticed that in Chambāḷī ghora 'horse', bhaī 'brother' and ghȯr 'house' are pronounced ghòra, bhàī and ghȯr, i.e., with tone completely predictable in terms of voiced aspiration. Similarly, in Bahl 1957b:33, we came across a Western Punjabi [dúgha] 'deep' which shows that also here, the high tone is not fully phonemic. Bailey further claims that the low tone is practically unknown in most of southern dialects of W. Pahari. It is difficult to see how a 'borrowing hypothesis' could account for the 'redundancy' types encountered in Western Punjabi and W. Pahari vs. the phonemicization of tones in general Punjabi.

1.3: These difficulties disappear if it is assumed that the tones of Punjabi, as well as of the Pahari dialects, are the result of regular sound changes.

1.3.1: Thus, low tone in initial syllables can be derived by a set of changes which devoice and deaspirate voiced aspirates (or drop /h/ after sonorants) word-initially. Consider the following examples:

Set (I).	/ghoṛ+a/	'horse'(m.sg)	>	[kòṛa]
	/nha/	'bathe'	>	[nà]
	/ghəṛ+a/	'pitcher'(m.sg)	>	[kəṛa]
	/dhol/	'drum'	>	[tòl]
	/lhaī/	'grace'	>	[lài]

The examples in set (I) indicate that historically, the low tone is independent of accent. The vowel immediately following voiced aspirates and sonorant + h was obligatorily assigned the low tone.

Synchronically, however, the low tone must be on the same syllable as the accent. Consider the following examples (where double underlining indicates the place of accent).

Set(II)	/dhəṛə̲k/	'throb'	[təṛə̲k]
	/bhəndə̲r/	'storage'	[pəndə̲r]

In the case of kòṛa 'horse' and kəṛa 'pitcher', of Set (I), the tone fails to occur on the second vowel which is stressed. This can be explained as the result of paradigm constraints on the shift of low tones to accented syllables (cf. also section 3.3 below).

1.3.2: Similarly, it is possible to formulate changes which deaspirate voiced aspirates and drop /h/, and which normally assign high tone to the preceding vowel in medial and final position.

Set(III)	/bəggh ī/	'buggy'	[bə́ggī]
	/ənnha/	'blind'	[ə́nna]
	/rahī/	'passenger'	[rá ī]
	/məggh/	'pitcher'	[mə́g]
	/labh/	'profit'	[lá b]
	/cah/	'desire'	[cá]

However, if the vowel <u>following</u> the voiced aspirates and h is <u>stressed</u>, it normally receives the low tone. Observe the following examples:

Set (IV)	non-causative		causative
/pəṛh/	'study'	[pə́ṛ]	[pəṛà]
/bUjjh/	'turn-off'	[bŬjj]	[bUjà]

1.3.3: According to Bloch (1925), these developments can be accounted for in the following fashion. Since the segment /h/ is voiceless, it cannot receive tone, whereas an accented vowel, being voiced, carries pitch. As a consequence, the sequence hV results in the low, rising tone. However, when an accented vowel precedes /h/, the high-falling tone is realized, since (again) the accented vowel has a higher pitch than h. Notice that in Bloch's analysis, tone arises only on accented vowels.

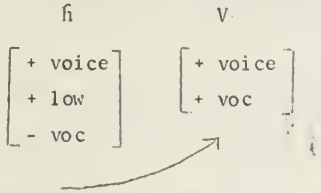
1.3.4: Although Bloch's analysis can, by and large, account for the data, it is incompatible with the insights offered by more recent theories on the origination of tones, such as that of Maran 1971.

1.3.5: A more satisfactory explanation has to take into consideration the by now well-established relationship between voicing and tone: voiced consonants are generally associated with low tone, and voiceless ones with high tone; cf. for instance Maran 1971 and Woo 1972.

On the basis of these insights, it is a priori possible to argue that the Punjabi low tone occuring after h (and original voiced aspirates) and the high tone before it, can be accounted for by postulating an earlier stage at which voiced /ɦ/ occurred initially, inducing following low tone, and voiceless h medially, inducing preceding high tone. However, such an analysis is inadequate on two grounds: (i) To postulate unvoiced h intervocalically is phonetically counterintuitive; (ii) this analysis fails to explain why low tone is realized after h in medial position.

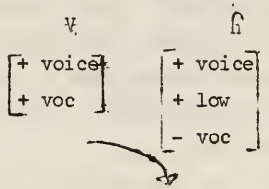
An alternative analysis which posits original voiced /ɦ/ for all environment can account for the attested tones more adequately.

Since the voiced /ɦ/ is [+ low tone], it will induce low or rising tone on the following vowel (i.e., the low tone starts low because of the /ɦ/ and rises because of the following vowel):



However, in medial/final position, since /ɦ/ is preceded by a vowel, the tone starts high (because of the vowel) and falls, since /ɦ/ is [+ low].

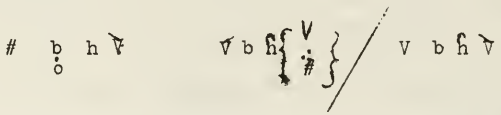
Thus, a high or falling tone is realized in such an environment:



1.3.6: Keeping in mind these natural phonetic developments, it is now possible to trace the historical development of Punjabi tone through four stages and to thus relate this development with other developments involving the voiced aspirates and h in the neighboring Indo-Aryan dialects.

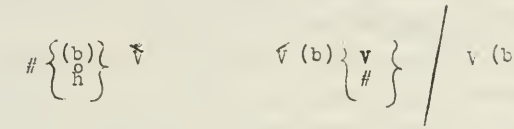
Stage I represents a stage of allophonic development of tones. At this stage, in the dialect area of Punjabi and Pahari, the voiced aspirates and h were voiced in all environments. Consequently, the low or rising tone was realized on following vowels and the high or falling tone was induced on preceding vowels. Some of the Western Pahari dialects have remained at this stage, since tones are still allophonic in these dialects.

Stage II is characterized by a change which devoiced the Indo-Aryan aspirates and h in initial environment in a large dialect area, including not only Punjabi and Pahari, but also Hindi (where initially, the voiced aspirates are phonetically lax voiceless aspirated stops, and where initial h is voiceless). As the result of this devoicing, the low tone following initial 'voiced' aspirates and h became unpredictable, since the phonetically voiceless articulation of these segments would predict high tone. On the other hand, the tones were still recoverable from voiced aspirates and h in medial position. This is the stage at which some Pahari dialects stopped in their development. In short, the following phonological situation emerged.



Stage III is characterized by a development shared by Punjabi, Kashmiri, and some of the Pahari dialects, namely a process of deaspiration affecting the old voiced aspirates. This was accompanied by a loss of

voiced /ĥ/ (in non-initial environments). These developments rendered the tones in Punjabi (and some of the Pahari dialects) unpredictable in all positions. Thus, the following phonological situation prevailed at this stage.



Note that since Kashmiri had not participated in the developments of stage I and II, in this dialect, the deaspiration process resulted in the actually attested voiced unaspirated stops, found in all environments, cf. the following examples.

/ghora/ 'horse' : /gur/
/jhīl/ 'lake' : /jīl/
/dhotī/ 'dhati/saree' : /dūt'/
/gəmbhīr/ 'serious' : /gəmbīr/

Stage IV represents a slight phonetic adjustment in Punjabi: The initial voiceless lax aspirated stops had, by deaspiration, resulted in voiceless lax unaspirated stops (e.g. $\underset{o}{bh} > \underset{o}{b}$ # ___). The resulting, very rich, unaspirated stop system ($\underset{o}{p}$: $\underset{o}{b}$: $\underline{b}$) then apparently was simplified by the merger of the voiceless lax stops ($\underset{o}{b}$ etc.) with the corresponding voiceless tense stops ($\underline{p}$ etc.).

1.3.7: The hypothesis developed in the preceding section thus not only provides for a principled phonetic explanation of Punjabi tones.[3] It also accounts for the 'aberrant' developments in some of the Pahari dialects (as more archaic stages in the same general development). And it relates these developments to other, more general phenomena found also in neighboring Indo-Aryan dialects, namely the voiceless (lax) character of initial 'voiced' aspirates and $\underline{h}$ in Hindi, and the deaspiration of the voiced aspirates in Kashmiri.

2.1: In addition to the changes discussed so far, it is necessary to assume a change which shifts low tone from (initial) unaccented syllables to

following accented syllables; cf. Set II in section 1.3.1 above.

2.2: Accent plays a role also in the case of original medial voiced aspirates or h. As indicated in section 1.3.2, there is a tendency to assign tone to the syllable preceding such a segment only if that syllable is accented. Otherwise, the following syllable is accented.

However, this tendency is by no means as strong and regular as the tone shift tendency discussed in the preceding section. As a matter of fact, there is apparently a contrary, even stronger tendency, namely to always place the high tone on the vowel preceding the aspirate or h, whether that vowel is accented or not. Compare the following examples:

/sʊ́bhav/ 'nature' > [sʊ́bav]
/vədhaĩ/ 'felicitations' > [və́daĩ̯]
/səhara/ 'support' > [sə́ra̯]
/prəbhu/ 'God' > [prə́bu]

Some words, in fact, may appear with both accentuations; cf. /nəhĩ̃/ 'no' > [nə́ĩ̃] or [nə̀ĩ̃].

Whatever the explanation of these two opposite tendencies may be, however, it seems that in paradigms, the two different patterns produced by these tendencies are utilized to differentiate potential homonyms. cf. the following synchronic derivations.

/pə̗rh+a/ 'study + Past. ppl.' → [pə́ra]
/pə̗rh+a/ 'study + Caus. suffix' → [pə̗rà̯]

That we are in fact dealing with disambiguating developments is shown by the synchronic derivation of yet another potential homonym:

/pə̗rh+a/ 'study + Past m.sg' → [pə́rIa]

Notice that the assignment of low tone to the causative suffix follows the general synchronic pattern of causative formation in Punjabi; cf. section 3.1 below.

2.3: An apparently recent phonetic development is the loss of tone sandhi.

Bailey (1915:IX) described Punjabi and Lahnda as having four tones: (1) high, (2) level, (3) deep (i.e. low), and (4) a combination of the first and third tone. Thus, according to him, tone sandhi takes place when the structural descriptions of both the low and the high tone developments are simultaneously satisfied, as in

/ḍ̗hahĩ/ 'knocked down(fem)' > [ṭ̗ãĩ]

(Here the initial aspirate predicts a low toned à, while the following h predicts a high toned á.)

However, it appears that since Bailey's time, tone (4) has merged with the low tone: Later observers report only three tones, with low tone occuring instead of Bailey's fourth tone: cf the following examples.

/bhabhī/ 'sister-in-law' : [pàbī] (Bahri 1972:242)
/ḍhūḍh/ 'search' : [tùnḍ] (Sharma 1971:44)

3: As the discussion in section 2.2 has shown, some of the phonetic changes so far discussed clearly have become morphologized. This is hardly surprising, considering that tone became phonetically unpredictable at the fairly early stage II. Other morphologizations include the following

3.1: Causatives of roots with high tone synchronically always lose that tone and have a low tone on the causative suffix; cf. the following correspondences.

		First Caus.	2nd Caus.
/pəṛh/	'study'	pəṛà	pəṛwà
/bÚjj/	'turn-off'	bUjà	bUjwà

3.2: All mid tone stems get the high tone in the imperative ordinary plural, the Hortative 2nd plural, and the future tense forms. (That is, these forms act as if they once had a medial h.)

stem		imp. ord. pl.	Hor. 2nd. pl.	future
/pa/	'to put on'	páo	páo	páuŋga
/lɔe/	'to take'	lɔ́wo	lɔ́wo	lɔ́waŋge

3.3: In section 1.3.1, the examples in Set (I) indicated that historically the low tone is assigned to a vowel immediately following the voiced aspirates and (sonorant) + h. The data presented in set (II) demonstrated that synchronically, however, the low tone must fall on the same syllable as the accent. However, examples such as kə̀ṛa 'pitcher' and kò̤ṛa 'horse' cannot be accounted for by such a syncaronic development. Since in examples such as [kə̀ṛa] and [kò̤ṛa] the accented vowel /a/ is a nominal masc.sg. marker, these exceptions can be explained as the result of nominal paradigm constraint on the shift of low tones to accented syllables; i.e. the shift of low tones fails to operate across nominal morpheme boundaries.

4: Since the tones developed in Punjabi as a consequence of regular sound change, the question arises whether in the synchronic grammar of Punjabi,

tones should be represented at the level of underlying representation or whether they should be derived by a set of rules in terms of underlying voiced aspirates or h, comparable to their derivation in the diachronic grammar of Punjabi. In what follows, I will examine the issues and conclude that tones have to be posited in the underlying representation of the synchronic grammar of Punjabi.

4.1: The following facts favor the 'derivational' hypothesis. It seems that tones are predictable and native speakers of Punjabi derive them by a set of internalized tone assignment rules:

(1) Even the uneducated speaker, when he reads his sacred text, Ādi Granth, which is written in Medieval Punjabi and in the Grumukhī script, assigns tones to graphemes such as voiced aspirates.

(2) If those uneducated people who have never visited Hindi-speaking areas are given Hindi words with a voiced aspirate, they automatically assign tones to them.

(3) Proper names, such as my last name, are pronounced with voiceless unaspirated stops and with the low tone on the following vowel (such as [pàtia] for /bhatia/) in the speech of uneducated Punjabi speakers. On the other hand, if any uneducated speaker of Punjabi is put into a Hindi-speaking environment, he can derive the Hindi cognates of the corresponding Punjabi words. (Code - switching with Hindi is very common among Punjabis, since Hindi has a higher status.)

The above facts suggest that somehow the speaker of modern Punjabi is familiar with the derivational history of his lexicon and assigns tones to a lexical item which does not have tone. The underlying reasons for such a process can be linguistic or non-linguistic (e.g. religion, the recitation of Ādi Granth, etc.). Also, they suggest that the tone-assignment rules seem to have some psychological reality for the speakers of Punjabi. Thus, an analysis which does not synchronically derive tones may be considered to fail to capture a significant generalization of the language and the psychological reality of tone rules in the synchronic grammar of Punjabi. Also, it will fail to account for the relationship between the orthography and the pronunciation.

4.2: On the other hand, it is not certain that the above facts require the assumption of a 'derived' status for the Punjabi tones.

(1) It can be argued that when an uneducated Punjabi reads his

sacred text, he substitutes tones for voiced aspirates since he is familiar with the synchronic pronunciation. Such a situation can be compared with English. For example, an English speaker knows that the k in knife is silent.

(2) the fact that a Punjabi speaker assigns tones to Hindi words can be explained by 'etymological' nativization. The native speakers of Punjabi observes pattern such as the following in the common lexicon of Hindi and Punjabi. The correspondence between Hindi bhV and Punjabi bV in inherited words enables the native speaker to transfer the pattern to other, non-inherited words, leading to the substitution of Hindi bhV for Punjabi bV (or vice versa). The generalization of this pattern sometimes leads to ill-formed outputs of 'Punjabiized' Hindi. Thus, words such as pəndàr 'storage' are pronounced as pəndhar in Hindi by Punjabi speakers, rather than the correct Hindi form bhəndar.

(3) The voiced aspirates never appear on the surface, and thus, postulating them at the underlying level would be a highly abstract analysis.

4.3: What cinches the argument against the 'derivational' status of Punjabi tone is the fact noted in sections 2.2.2 and 3.1-3 above, namely that tone has become morphologized and thus is no longer predictable in terms of underlying aspiration or h.

Thus, tones have to be represented at the level of underlying representation in the synchronic grammar of Punjabi.

5: The following conclusions can be drawn from the above discussion:

(1) Historically, tones were induced by voiced aspirates or voiced [ɦ]. The low or rising tone was realized after it, and the high or falling tone before it.

(2) The unpredictable morphology and the non-occurrence of voiced aspirates and medial h at the surface level constitute major arguments against deriving tones by a set of synchronic rules. Thus, tones are a part of the underlying representation.

(3) Synchronically, tones usually fall on accented vowels. However, this distribution is subject to paradigmatic and transparency constraints.

Footnotes

[1]I would like to thank Professor Michael Kenstowicz for his comments on an earlier draft of this paper. I am also indebted to Professor Hans H. Hock for his insightful comments and suggestions on this paper. But for the many hours of discussion with him, this paper would be much more imperfect than it is. My thanks are also due to R. Pandharipande and S. N. Sridhar for their helpful suggestions.

[2]Note, however, that there is some disagreement concerning the phonetic characterization of Punjabi tones. The following table presents the various views on this subject.

Low Tone	
Bailey (1915:IX)	'deep or low-rising'
Bahl (1957:143)	'The glide of this tone starts at a low level, falls down, and rises to the mid level'
Gill (1960:11)	'low onset followed by a higher pitch rising to mid level'
Sampat (1964:110)	'rising tone in the beginning of utterance, falls slightly, and then rises'
Sethi (1971:2)	'on a rising-falling tone syllable, pitch rises from low to mid level and then there is a fall'
Bahri (1972:xviii)	'/ˆ/ is marked by falling pitch contour from a high level to a low level.

High Tone	
Bailey (1915:IX)	'high-or rising-falling'
Bahl (1957:145)	'starts at about mid level, rises high, and falls down'
Gill (1960:11)	'rising onset followed by the same pitch /ˊ/.'
Sampat (1964:110)	'begins at a higher value...falls off steeply'
Sethi (1971:2)	'on a falling tone syllable, the pitch falls from high to mid level.'
Bahri (1972:xviii)	/ˆ/ the production of high tone is marked by its high-rising falling-rising pitch contour.

[3]As noted in the preceding footnote, there is some disagreement on the phonetic nature of Punjabi tones. It seems that two conflicting patterns are currently found in the production of the low and the high tone. In one dialect (D_1), the low tone is characterized by a low-rising pitch and the high tone by high-falling pitch. Most linguists subscribe to this characterization of Punjabi tone. However, there is another tonal dialect (D_2). In D_2, the low tone starts high and falls,

whereas the high tone starts low and rises. Bahri subscribes to this phonetic characterization of Punjabi. Also my own dialect of Punjabi seems to belong to this dialect.

Historically, D_1 no doubt presents the oldest tonal characteristics, whereas D_2 represents a new pattern which started at Stage II. At this stage in D_2, the voiced aspirates and h apparently were reanalyzed as unvoiced in all environments. Since voiceless segments are [+ high], a high or falling tone was realized after them, and a low or rising tone before them.

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