BLS 33, No 1 2007. DOI: http://dx.doi.org/10.3765/bls.v33i1.3519
(published by the Berkeley Linguistics Society and the Linguistic Society of America)

Stress in Punjabi

RAJDIP DHILLON
Yale University

0. Introduction

Punjabi[1] is an Indo-Aryan language spoken in northwest India and parts of Pakistan. Assignment of stress in Punjabi is entirely predictable, yet it patterns differently in disyllabic and trisyllabic words.

Although a derivational approach to Punjabi stress is capable of characterizing the pattern of stress assignment in disyllabic and trisyllabic words, it is not without its flaws. The most apparent of which is that it lacks unification in that it requires one set of rules to apply to disyllabic words and another entirely different set of rules to apply to trisyllabic words. As will be illustrated in Section 2, the rules required by the derivational approach ultimately appear unnatural and are without typological force.

Optimality Theory, on the other hand, can provide a unified system in which both disyllabic and trisyllabic words can be handled under a single ranking using typologically attested constraints. An Optimality Theoretic analysis of Punjabi stress is presented here, as well as a brief exploration of Hindi, Sindhi, and Urban Hijazi Arabic—three languages with stress systems similar to that of Punjabi.

1. Overview of Basic Properties of Stress in Punjabi

Punjabi exhibits a three-way distinction in syllable weight with monomoraic light syllables, bimoraic heavy syllables, and trimoraic superheavy syllables. Punjabi also possesses a left-dominant stress system, requiring the construction of moraic trochees. Foot construction is from right to left and degenerate feet are permitted. Syllables are minimally bimoraic and ternary feet are permitted. Possible types of monosyllabic words in Punjabi are shown in (1).

(1)	(C)VV	mee	‘me’
	(C)VVC	tʃaaɽ	‘four’
	(C)VC	kal	‘yesterday/tomorrow’
	(C)VCC	betʃtʃʰ	‘inside’

[1] The dialect examined here is spoken in villages near the city of Amritsar, India.

In Punjabi, secondary stress is not found and main stress is not contrastive.[2] For instance, there are no such contrastive patterns as LŚH and Ĺ SH.[3]

Stress is also not affected by morphology. In the verb forms in (2), the addition of a suffix to the verb stem does not alter stress placement; nor does the addition of the plural suffix alter stress placement for the nominal forms in (3). As will be shown in Section 2, stress in Punjabi is distributed solely according to a pattern based on the weight of the syllables contained within a word. The same phenomenon is evident in Hindi (Hayes 1995, Pandey 1989, Kelkar 1968) and Sindhi (Walker 1997)—two Indo-Aryan languages closely related to Punjabi.

(2)	léenaa	'to take'
	lée	'take' (present/imperative)
	léelaa	'you may take it'
	léedʒaa	'it is suggested that you take it (and go)'
(3)	gádʒəɽ	'carrot'
	gádʒəɽaa	'carrots'

2. Stress Assignment in Disyllabic and Trisyllabic Words

To repeat, the placement of stress in Punjabi is entirely predictable, yet it patterns differently in disyllabic and trisyllabic words. An exhaustive list of stress patterns for disyllabic words is shown in (4) and for trisyllabic words in (5).[4]

(4)	Ĺ H	pɛ́.laa	'before/earlier'
	H́H	kán.daa	'thorn'

[2] Arun (1961) and Bhatia (1993) incorrectly claim that stress is contrastive in some instances and provide the following supporting data:

i)	gálaa	'throat'	ii)	galáa	'cause to melt'
	tálaa	'sole'		taláa	'cause to fry'
	bálaa	'evil spirit'		baláa	'call'

(Bhatia 1993: 343)

One crucial factor overlooked by Arun and Bhatia is that the word-medial approximants in the words in (i) are actually geminates—which in general are not contrastive with single consonants—thus making the words in (i) of the form $\acute{\sigma}_{\mu\mu}\ \sigma_{\mu\mu}$ and not $\acute{\sigma}_{\mu}\ \sigma_{\mu\mu}$. A second crucial factor overlooked by Arun and Bhatia is that the words in (ii) are actually monosyllabic—the first vowel in each of these words undergoes deletion.

[3] L=light syllable, H=heavy syllable, S=superheavy syllable

[4] Vijayakrishnan (2003) lists the same stress patterns found in (4) and (5) but does not list the trisyllabic pattern Ĺ LH and includes the additional pattern H́LS, for which he does not provide any examples of corresponding Punjabi words. H́LS is unattested in the dialect examined here and consequently will not be explored here, although the OT analysis presented in Section 3.2 is capable of handling this pattern.

	ŚH	dɔ́ɔl.naa	‘to spill’
	ŚS	áadʒ.kaal	‘nowadays’
	LŚ	bə.máaɽ	‘sick’
	HŚ	təɽ.búudʒ	‘watermelon’

(5)	ĹLH	tʃí.ʈi.aa	‘letters’
	ĤLH	hóɽ.te.ɽaa	‘odd’
	ĤHS	mə́ŋ.gɔl.vaaɽ	‘Tuesday’
	ĹHS	mí.ɽaa.kɔɔl	‘near/next to me’
	HĤH	bəkʰ.súu.wii	‘safety pin’
	LĤH	bɪ.ʃáa.naa	‘to lay something down’
	LŚH	bɪ.tʃáaɽ.naa	‘to think’
	HŚH	səŋ.gíit.naa	‘to sing and dance’

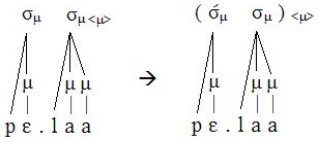
What the data in (4) and (5) indicate is that neither morphology nor lexical government of stress assignment is applicable to stress assignment in Punjabi. Instead, stress assignment can be characterized on a ‘templatic’ basis, where a template, such as an ĹH ‘template’, is formed on the basis of syllable weight.

To account for the stress patterns using a derivational account, two separate sets of rules are needed. The rules applicable to disyllabic words are listed in (6).

(6)	Rule 1:	Stress the leftmost superheavy (trimoraic) syllable; superheavy syllables constitute feet
	Rule 2:	Mark the final mora as extrametrical
	Rule 3:	Stress the head of the leftmost foot

A derivation of the ĹH pattern can be seen in (7). How the rules in (6) operate with respect to foot construction and stress assignment is shown in (8).

(7) pɛ́.laa ‘before/earlier’



(8)	ĹH	(σ́μ σμ) <μ>	ĤH	(σ́μμ) σμ<μ>
	ŚH	(σ́μμμ) (σμμ)	ŚS	(σ́μμμ)(σμμμ)
	LŚ	σμ (σ́μμμ)	HŚ	(σμμ)(σ́μμμ)

Rule 1 blocks the application of Rules 2 and 3. Additionally, there is a preference for stressing superheavy syllables. Other languages which stress superheavy syllables include Hindi (Pandey 1989), Estonian (Hayes 1995), various dialects of Arabic (Hayes 1995), and St. Lawrence Island Yupik (Hayes 1995). Due to this preference, stress assignment requires a ‘look-ahead’ property such that, rather

than assign stress in a serial fashion, the entire word must be surveyed to detect superheavy syllables.

Among the languages requiring a similar 'look-ahead' property are Turkish (Inkelas 1994, Sezer 1981), Hindi (Hayes 1995, Pandey 1989), and Sindhi (Walker 1997). Regarding Turkish, Inkelas (1994) outlines what is known as the 'Sezer' stress pattern in which an antepenultimate syllable is stressed if it is heavy and the penultimate syllable is light; otherwise, the penultimate syllable is stressed. With respect to Hindi,[5] Hayes (1995) provides weight-based rules for words with three or more syllables. Hayes' first rule is to stress a heavy penult. If a heavy penult is not present, then a heavy antepenult is stressed. If neither of these conditions can be met (i.e. for words ending in LLσ) then the preantepenult is stressed if the final syllable is light or the antepenult is stressed if the final syllable is heavy or if the word is trisyllabic. According to Hayes' rules, it is necessary to 'look ahead' to determine the weight of the syllables within the word and potentially the number of syllables in the case of trisyllabic words.

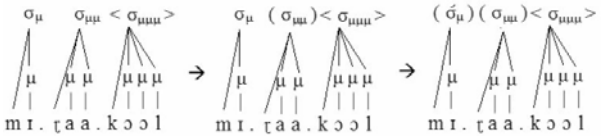
Sindhi (Walker 1997) operates in a manner very similar to that of Hindi. The rules governing stress assignment in Sindhi are such that, if there is only one heavy syllable in a word, it is stressed. Otherwise, the rightmost heavy syllable is stressed, skipping the last. If there are no heavy syllables, the penultimate syllable is stressed. In Sindhi, the 'look ahead' property is necessary first to detect whether heavy syllables are present and second to detect the number of heavy syllables.

Returning to Punjabi stress, (9) outlines the set of rules for trisyllabic words. A derivation of the ĹHS stress pattern is presented in (10). How the rules in (9) operate with respect to foot construction and stress assignment is shown in (11).

(9)

	Rule 1:	Mark final trimoraic feet as extrametrical
	Rule 2:	Stress the head of the penultimate foot
	Rule 3:	If no such foot exists, stress a degenerate foot in strong metrical position

(10) mí.ɽaa.kɔɔl 'near/next to me'



(11)

ĹLH	(σ́μ σμ)(σμμ)	HĺLH	(σ́μμ) σμ (σμμ)
HĺHS	(σ́μμ)(σμμ) < σμμμ >	ĹHS	(σ́μ)(σμμ) < σμμμ >
HHĺH	(σμμ)(σ́μμ)(σμμ)	LHĺH	σμ (σ́μμ)(σμμ)
LŚH	σμ(σ́μμμ)(σμμ)	HŚH	(σμμ)(σ́μμμ)(σμμ)

[5] A great deal of disagreement exists regarding the patterns of stress assignment in Hindi (Hayes 1995, Pandey 1989, Mohanan 1979, Ohala 1977, Kelkar 1968). However, Pandey (1989) attributes the reported differences in stress assignment to the particular dialects being examined.

As the final mora is extrametrical for the disyllabic stress system, the trisyllabic system instead considers final superheavy (trimoraic) syllables to be extrametrical. Latin and Palestinian Arabic also employ moraic trochees (Hayes 1995). Latin considers entire final syllables extrametrical in particular contexts and Palestinian Arabic at times considers rightmost feet extrametrical. Thus it is entirely plausible for Punjabi to consider final trimoraic syllables extrametrical.

The main argument for degenerate feet in strong metrical positions being counted in the foot inventory for Punjabi is derived from the same phenomenon occurring in Auca (Hayes 1995). Auca constructs syllabic trochees from left to right and the strong position is the rightmost position. If a syllable in strong position cannot be paired with another to form a trochee, then that syllable is allowed to constitute a degenerate foot which is then counted in the foot inventory and is capable of bearing stress. Thus for Punjabi, it is perfectly reasonable for degenerate feet in strong metrical positions (i.e. the position of the second foot from the right edge) to be counted in the foot inventory.

Unlike Auca, which allows degenerate feet to comprise part of the foot inventory if they are in the rightmost position, trisyllabic words in Punjabi require a 'foot count' in order to determine if a degenerate foot will enter the foot inventory. Consequently, the rules in Punjabi can be viewed as being somewhat iterative. First, final superheavy syllables must be considered extrametrical. Then bimoraic and trimoraic (superheavy) feet are constructed and stress falls on the head of the second foot from the right edge of the word. If no such foot exists, then a degenerate foot occupying that position may enter the foot inventory and bear stress, as previously seen in (10).

In assessing the rules necessary to assign stress in Punjabi, although they may prove to be successful in predicting where stress falls, they do not come without some major pitfalls. The largest and most obvious of which is a lack of unification. The derivational approach to Punjabi, as outlined in (6) and (9), requires a different set of rules to derive stress each time a word with a different number of syllables is encountered.

Another issue with the derivational approach is that it yields two very divergent sets of rules. This divergence makes apparent an inconsistency with respect to extrametricality. In disyllabic words, final moras are extrametrical, whereas in trisyllabic words, final superheavy syllables are extrametrical.

Other differences between stress assignment in disyllabic and trisyllabic words become evident in examining the diverging sets of rules. For instance, stressing final syllables in trisyllabic words is avoided, but it is permitted in disyllabic words. Additionally, trisyllabic words do not exhibit the property of quantity sensitivity that disyllabic words display. Under the rules presented in (9), there is no preference for stressing superheavy syllables. Instead, we see an assortment of light, heavy, and superheavy syllables bearing stress.

As stress assignment in disyllabic words is unbounded, it is clearly bounded in trisyllabic words—the head of the *second* foot from the right edge is stressed. According to the rules in (6) and (9), the only similarities between stress assign-

ment in disyllabic words and trisyllabic words are the properties of left-dominance and right-to-left directionality.

In essence, the rules expressed in (6) and (9) neither reveal anything about the system of stress assignment in Punjabi nor provide a means of relating the system to the stress systems of other languages. Despite the success in predicting the location of stress, the derivational approach merely provides a descriptive mechanism for handling stress assignment in Punjabi and lacks any typological force.

3. An Optimality Theoretic (OT) Approach

Ideally, an OT approach will prove to be more successful than the derivational approach discussed in Section 2 by producing a single set of constraints to account for stress assignment in both disyllabic and trisyllabic words.

3.1. Deriving Stress in Disyllabic Words

Recall the stress patterns in (4) for disyllabic words. What is particularly noticeable in these patterns is a strong preference for stressing superheavy and leftmost syllables. What will also become evident later is a tendency for a foot to be constructed at the right edge of the word. These preferences can be characterized by the constraints SUPERHEAVY, LEFTMOST, and ALIGN-FT-RIGHT.

(12) **SUPERHEAVY**
Superheavy syllables are stressed
(Oostendorp 2002)

(13) **LEFTMOST**
The head foot is leftmost in PrWd

(14) **ALIGN-FT-RIGHT**
Every PrWd ends in a foot

Given the pattern ŚS, it is clear that is equally important to stress a superheavy syllable and to stress the leftmost foot. Subsequently, this results in the equal ranking of the constraints SUPERHEAVY and LEFTMOST.

With the exception of superheavy syllables, it is clear that there is a tendency to avoid stressing final syllables. The following constraint characterizes this:

(15) **NONFINALITY**
The prosodic head of the word does not fall on the word-final syllable
(Prince and Smolensky 2002)

This constraint must be ranked below the equally-ranked constraints SUPERHEAVY and LEFTMOST. This ranking is necessitated by the fact that, in patterns such as LŚ and HŚ, there is a stronger preference for superheavy syllables to be stressed than for avoiding assigning stress to final syllables.

Furthermore, since Punjabi allows degenerate feet, the constraint FT-BIN is necessary.

(16) **FT-BIN**
Feet are binary under moraic analysis

This constraint must be ranked below NONFINALITY since, in the pattern ĹH, a degenerate foot must be constructed to avoid stressing the final syllable.

The ranking of the constraints introduced so far is seen in (17). This ranking accounts for all of the disyllabic patterns, as shown in the tableaux for select patterns in (18) through (20).

(17) **LEFTMOST, SUPERHEAVY, ALIGN-FT-RIGHT >> NONFINALITY >> FT-BIN**

(18)

Input: LH	LEFTMOST	SUPERHEAVY	ALIGN-FT-R	NONFINALITY	FT-BIN
☞(Ĺ)(H)					*
L(Ĥ)				*!	
(L)(Ĥ)	*!			*	*
(Ĺ)H			*!		*

(19)

Input: HH	LEFTMOST	SUPERHEAVY	ALIGN-FT-R	NONFINALITY	FT-BIN
☞(Ĥ)(H)					
H(Ĥ)				*!	
(H)(Ĥ)	*!			*	

(20)

Input: LS	LEFTMOST	SUPERHEAVY	ALIGN-FT-R	NONFINALITY	FT-BIN
☞ L(Ś)				*	*
(Ĺ)(S)		*!			**
(L)(Ś)	*!			*	**

By using the ranking in (17), all suboptimal forms are eliminated by the constraints LEFTMOST, SUPERHEAVY, ALIGN-FT-R, and NONFINALITY. Furthermore, the requirement that final moras be extrametrical in the derivational approach is avoided here. Thus the ranking in (19) effectively captures the tendency to stress either leftmost or superheavy syllables in disyllabic words.

3.2. Deriving Stress in Trisyllabic Words

Deriving a single set of ranked constraints to characterize trisyllabic patterns requires additional constraints to those introduced in Section 3.1. With the exception of the pattern ĹHS, there is a general avoidance of degenerate feet in trisyllabic words. The Weight-to-Stress-Principle (henceforth WSP) characterizes this avoidance by enforcing a preference for stressing heavy or superheavy syllables. Additionally, it is necessary for syllables to be parsed into feet to some extent. For instance, if the pattern ĹHS is not exhaustively parsed into feet such that it contains a degenerate foot, stress will not be assigned to it correctly.

(21) **WSP (WEIGHT-TO-STRESS PRINCIPLE)**
Heavy syllables receive stress

(22) **PARSE-SYLLABLE**
Syllables are parsed into feet

The ranking of WSP and PARSE-SYL with respect to the constraints introduced in Section 3.1 is fairly simple. WSP cannot be ranked above NONFINALITY, as that would result in suboptimal disyllabic forms being deemed optimal, such as L(H́) being incorrectly predicted as the most optimal outcome over(Ĺ)(H). WSP must be ranked below NONFINALITY and above FT-BIN since it is more important for heavy and superheavy syllables to bear stress when in non-final positions than it is for feet to be binary—as superheavy feet violate FT-BIN since they are ternary. As with WSP, PARSE-SYL must be ranked below NONFINALITY, as it is more important for final syllables in trisyllabic words to avoid bearing stress than it is for all syllables to be exhaustively parsed into feet. PARSE-SYL must also be ranked above FT-BIN, as it would result in suboptimal forms being deemed optimal otherwise. While WSP and PARSE-SYL must be ranked intermediate to NONFINALITY and FT-BIN, their ranking with respect to each other is quite problematic, as neither the ranking in (23) nor the ranking in (24) is successful.

(23) **LEFTMOST, SUPERHEAVY, ALIGN-FT-R >> NONFINALITY >> WSP >> PARSE-SYL >> FT-BIN**

(24) **LEFTMOST, SUPERHEAVY, ALIGN-FT-R >> NONFINALITY >> PARSE-SYL >> WSP >> FT-BIN**

While the ranking in (23) can handle a number of the trisyllabic stress patterns, it predicts the incorrect candidate for the pattern ĹHS. While the ranking in (24) predicts the correct candidate for the pattern ĹHS, it predicts the incorrect candidate for LH́H, which requires the ranking in (23). An additional issue involves the pattern HH́H. Under either ranking, a form in which the second syllable of the pattern bears stress is never predicted as being optimal. Instead, the incorrect candidate (H́)(H)(H) is predicted as being optimal by both rankings.

Given the behavior of the patterns ĹHS, LH́H, and HH́H, it is clear that a repair constraint is needed:

(25) **CONTOUR (H́)(H)**
Leftmost footed heavy syllables are stressed in sequences of (H)(H)

With respect to the pattern HH́H, CONTOUR (H́)(H) militates against all three syllables being footed, which would result in stress incorrectly being assigned to the initial syllable. In conjunction with ALIGN-FT-R, the sequence (H́)(H)H is avoided. When immediately dominated by NONFINALITY, CONTOUR (H́)(H) repairs the problems which arise with the patterns LH́H and HH́H and allows for the correct forms to be considered optimal. Subsequently, this allows for a rank-

ing in which PARSE-SYL is ranked above WSP, repairing the problems surrounding ĹHS. The final ranking and supporting tableaux are shown below.

(26) **LEFTMOST, SUPERHEAVY, ALIGN-FT-R >> NONFINALITY >> CONTOUR (Ĥ)(H) >> PARSE-SYL >> WSP >> FT-BIN**

(27)

Input: LHS	LEFT-MOST	SUPER-HEAVY	ALIGN-FT-R	NON-FINALITY	CONTOUR (Ĥ)(H)	PARSE-SYL	WSP	FT-BIN
☞ (Ĺ)(H)(S)		*					*	**
L(Ĥ)(S)		*				*!		*
L(H)(Ś)	*			*!		*		*

(28)

Input: LHH	LEFT-MOST	SUPER-HEAVY	ALIGN-FT-R	NON-FINALITY	CONTOUR (Ĥ)(H)	PARSE-SYL	WSP	FT-BIN
☞ L(Ĥ)(H)						*		
(Ĺ)(H)(H)					*!		*	*
L(H)(Ĥ)	*!			*	*	*		

(29)

Input: HHH	LEFT-MOST	SUPER-HEAVY	ALIGN-FT-R	NON-FINALITY	CONTOUR (Ĥ)(H)	PARSE-SYL	WSP	FT-BIN
(H)(Ĥ)(H)	*!				*			
☞ H(Ĥ)(H)						*		
(Ĥ)(H)(H)					*!			
(Ĥ)(H)H			*!			*		
(H)(H)(Ĥ)	*!			*	**			

In comparison to the derivational approach, the OT approach proves to be superior. Not only is it unified in the sense that only one ranking is necessary to depict the assignment of stress in both disyllabic and trisyllabic words, but it also uses typologically grounded constraints—discussed further in Section 4—and is not merely a descriptive account as the derivational account is. Furthermore, the OT account eliminates other issues which arise with the derivational account such as the lack of unification and the inconsistencies with respect to extrametricality.

The OT analysis offered here reveals many characteristics of Punjabi's system of stress assignment—and these characteristics can further be related to the stress systems of other languages. For instance, the OT analysis reveals that Punjabi has a preference for stressing superheavy syllables, tends to avoid assigning stress to final positions, and prefers sequences of (Ĥ)(H) when faced with two adjacent footed heavy syllables. The analysis also reveals that syllable weight is a significant factor in Punjabi and that there is a preference for stressing heavy syllables.

In addition to these aforementioned characteristics which the derivational account misses, the OT account reveals another general tendency in the manner in which stress is assigned in Punjabi: foot construction occurs from right to left and stops once an appropriate foot has been detected that can bear stress—yielding stress placement on the leftmost foot, as seen in (30) and (31).

(30)	(Ĺ)(H)	(Ĥ)(H)	(Ś)(H)	(Ś)(S)
	L(Ś)	H(Ś)		
(31)	(ĹL)(H)	(Ĥ)L(H)	(Ĥ)(H)(S)	(Ĺ)(H)(S)
	H(Ĥ)(H)	L(Ĥ)(H)	L(Ś)(H)	H(Ś)(H)

While the OT analysis is able to make the generalization that foot construction begins at the right edge and continues until an appropriate stress-bearing foot has been detected and constructed, the derivational approach misses this, as evidenced by the stress patterns it yields for words with sequences of HŚ, HĤH, or HŚH, as seen in (8) and (11). In sum, the derivational approach to Punjabi stress proves to be rather undesirable.

4. Establishing the CONTOUR (Ĥ)(H) Constraint

CONTOUR (Ĥ)(H) is essentially an alignment constraint which aligns stress with a left-edged footed heavy syllable. Constraints of this nature are not atypical within OT. For instance, Inkelas (1994) proposes the constraint CONTOUR *HĹ for Turkish which prohibits the sequence of a heavy unstressed syllable followed by a stressed light syllable. Kager (1992) proposes the constraint *(ĹH) which prohibits L-H trochaic feet. According to Kager, the *(ĹH) constraint is necessary for Finnish and the Australian languages Yindjibarndi, Guugu Yimidhirr, and Gooniyandi.

While CONTOUR (Ĥ)(H) can be argued to simply be another member within a family of CONTOUR constraints, it still requires typological force. In which case, examination of Hindi, Sindhi, and Urban Hijazi Arabic is essential.

Like Punjabi, the stress system of Hindi (Kelkar 1968) and a subsection of the stress system of Urban Hijazi Arabic (Al-Mohanna 2004) possess a three-way syllable weight distinction, exhibit right-to-left directionality with respect to foot construction, have a preference for stressing superheavy syllables, and tend to avoid final stress. Sindhi (Walker 1997) possesses the same characteristics with one exception. Sindhi, which exhibits a two-way syllable weight distinction between light and heavy syllables, has a preference for stressing heavy syllables instead. The most notable characteristics all three languages share with Punjabi are that they all contain the stress patterns ĤH and HĤH and foot them in the same manner. All three languages only foot what is necessary starting from the right edge and continue until an appropriate stress-bearing foot has been detected and constructed, resulting in stress placed on the leftmost foot.

According to the dialect of Hindi examined by Kelkar (1968), the rules for stress assignment stipulate that 1) superheavy syllables are stressed, 2) in sequences where multiple superheavy syllables exist, the rightmost non-final superheavy syllable is stressed, 3) if a superheavy syllable is not present, the heaviest syllable from the right edge is stressed, and 4) if a superheavy syllable is not present and the remaining heaviest syllables are equivalent in weight, the rightmost non-final syllable is stressed. Given these rules, the similarities between the stress systems of Hindi and Punjabi become quite evident. With respect to

only footing the necessary material and placing stress on the leftmost foot, this characteristic can be seen in the following footed stress patterns for Hindi:

(32)	(H́)(H)	(Ś)(S)	L(H́)	L(Ś)	H(Ś)
	L(H́)(H)	S(Ś)(S)	(Ś)(H)(S)	(Ś)(H)(H)	L(ĹL)
	LH(Ś)	HL(Ś)	H(H́)(H)	L(H́)(H)	HHL(Ś)

Given these patterns and the similarity in stress systems between Punjabi and Kelkar's Hindi, it appears that Hindi uses the same constraints as Punjabi and essentially the same ranking, but with one main difference: the placement of NONFINALITY and WSP within the ranking is reversed, as seen in (33).

(33) **LEFTMOST, SUPERHEAVY, ALIGN-FT-R >> WSP >> CONTOUR (H́)(H) >> PARSE-SYL >> NONFINALITY >> FT-BIN**

In Sindhi (Walker 1997), if a word only contains one heavy syllable, then it receives stress regardless of the location of the heavy syllable, as seen in (34). If there are multiple heavy syllables, the rightmost non-final heavy syllable receives stress, as seen in (35). If no heavy syllables are present, then the rightmost non-final foot is stressed, as seen in (36). Again, the leftmost foot bears stress.

(34)	L(H́)	(H́)L	L(H́)L	(H́)(LL)	LL(H́)LL
(35)	(H́)(H)	H(H́)(H)	(H́)L(H)	(H́)(LL)(H)	HL(H́)(H)
	HHH(H́)(LL)	HHHH(H́)(H)	HHHHH(H́)L		
(36)	(ĹL)	L(ĹL)			

The stress system of Urban Hijazi Arabic shares a number of characteristics with the systems of Punjabi, Hindi, and Sindhi and so it too requires the use of CONTOUR (H́)(H), as evidenced by the following footed patterns:

(37)	(ĹL)	(Ĺ)(H)	L(Ś)	H(Ś)	(H́)L
	(H́)(H)	H(H́)(H)	(H́)L(H)	(Ĺ)(LL)	(ĹL)(H)
	H(H́)(LL)				

As has been demonstrated, CONTOUR (H́)(H) belongs to a family of CONTOUR constraints and is typologically attested. The applicability of CONTOUR (H́)(H) to both Indo-Aryan and non-Indo-Aryan languages indicates that the necessity of the constraint reaches beyond a small group of related languages.

5. Conclusion

What has been presented here is the system of stress assignment in Punjabi—a system which at first appears quite unusual but is actually rather typical when compared to the systems of other related languages. Characterizing the stress system of Punjabi within Optimality Theory yields an analysis in which general-

ized properties of the system become evident—and it is these properties which can be related to other languages in order to assess some degree of similarity.

References

Al-Mohanna, Faisal M. 2004. Paradoxical Non-finality: Stress Assignment in Three Arabic Dialects. Ms., King Saud University.

Arun, Vidya B. 1961. *A Comparative Phonology of Hindi and Panjabi.* Ludhiana, India: Panjabi Sahitya Akademi.

Bhatia, Tej K. 1993. *Punjabi: A Cognitive-Descriptive Grammar*. London: Routeledge.

Hayes, Bruce. 1995. *Metrical Stress Theory: Principles and Case Studies.* Chicago: University of Chicago Press.

Inkelas, Sharon. 1994. Exceptional Stress-Attracting Suffixes in Turkish: Representation vs. the Grammar. Presented at the Workshop on Prosodic Morphology, Utrecht University.

Kager, René. 1992. Shapes of the Generalized Trochee. *WCCFL* 11:298-312.

Kelkar, Ashok R. 1968. *Studies in Hindu-Urdu, Part I: Word Phonology.* Poona, India: Deccan College.

Mohanan, K. P. 1979. Stress in Malayalam, Hindi, and Gujarati. Ms., MIT.

Ohala, Manjari. 1977. Stress in Hindi. In L. Hyman, ed., *Studies in Stress and Accent, Occasional Papers in Linguistics* 4, 327-338. Los Angeles: University of Southern California.

Oostendorp, Marc van. 2002. The Phonological and Morphological Status of the Prosodic Word Adjunct. *Linguistische Berichte* 11:209-236.

Pandey, Pramod K. 1989. Word Accentuation in Hindi. *Lingua* 77:37-73.

Prince, Alan and Paul Smolensky. 2002. Optimality Theory: Constraint Interaction in Generative Grammar. Ms., Rutgers University and Johns Hopkins University.

Sezer, Engin. 1981. On Non-Final Stress in Turkish. *Journal of Turkish Studies* 5:61-69.

Vijayakrishnan, K. G. 2003. Stress and Tone in Punjabi. *CIEFL Occasional Papers in Linguistics,* Vol. 10. Hyderabad: CIEFL.

Walker, Rachel. 1997. Mongolian Stress, Licensing, and Factorial Typology. Ms., University of California, Santa Cruz.

Rajdip Dhillon
Department of Linguistics
Yale University
370 Temple Street, Rm. 204
New Haven, CT 06520-8366

rajdip.dhillon@yale.edu